

North American F-86

Airworthiness Certification



AIR-230 Airworthiness Branch
Federal Aviation Administration
Washington, D.C.
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Introduction – F-86 Airworthiness Certification

This document provides information to assist in the airworthiness certification and safe civil operation of a North American F-86 aircraft.

Attachment 1 provides a general overview of this document. Attachment 2 contains background information on the F-86 aircraft. Attachment 3 lists historic airworthiness issues with the F-86 for consideration in the certification, operation, and maintenance of these aircraft. The list is not exhaustive, but includes our current understanding of risks that should be assessed during in the certification, operation, and maintenance of these aircraft. Concerns regarding particular issues may be mitigated in various ways. Some may be mitigated via the aircraft maintenance manual(s) or the aircraft inspection program. Others may be mitigated via operating procedures i.e., SOPs) and limitations, aircraft flight manual changes, or logbook entries

Not all issues in attachment 3 may apply to a particular aircraft given variations in aircraft configuration, condition, operating environment, or other factors. Similarly, circumstances with an aircraft may raise other issues not addressed by attachment 2 that require mitigation. Attachment 4 includes additional resources and references. Attachment 5 provides some relevant F-86 accident and incident data.

Attachment 1 – Overview of this Document

Purpose

This document is to provide all those involved in the certification, operation, and maintenance of the North American F-86 with safety information and guidance to help assess and mitigate safety hazards for the aircraft. The existing certification procedures in FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products, do not account for many of the known safety concerns and risk factors associated with many high-performance former military aircraft. These safety concerns and risk factors associated with many high performance former military aircraft include—

- Lack of consideration of inherent and known design failures;
- Several single-point failures;
- Lack of consideration for operational experience, including accident data and trends;
- Operations outside the scope of the civil airworthiness certificate;
- Insufficient flight test requirements;
- Unsafe and untested modifications;
- Operations over populated areas (the safety of the non-participating public has not been properly addressed in many cases);
- Operations from unsuitable airports (i.e., short runways, Part 139 (commercial) airports);
- High-risk passenger carrying activities taking place;
- Ejection seat safety and operations not adequately addressed;
- Weak maintenance practices to address low reliability of aircraft systems and engines;
- Insufficient inspection schedules and procedures;
- Limited pilot qualifications, proficiency, and currency;
- Weapon-capable aircraft not being properly demilitarized, resulting in unsafe conditions;
- Accidents and serious incidents not being reported; and
- Inadequate accident investigation data.

Research of F-86 Safety Data

The aircraft, relevant processes, and safety data are thoroughly researched and assessed. This includes—

- Aviation Safety (AVS) Safety Management System (SMS) policy and guidance;
- Historical military accident/incident data and operational history;
- Civil accident data;
- Safety risk factors;
- Interested parties and stakeholders (participating public, non-participating public, associations, service providers, air show performers, flying museums, government service providers, airport owners and operators, many FAA lines of business, and other U.S. Government entities);
- Manufacturing and maintenance implications; and
- Design features of the aircraft.

This Document

The document is a compilation of known safety issues and risk factors identified from the above research that are relevant to civil operations. This document is organized into four major sections:

- General airworthiness issues (grey section),
- Maintenance (yellow section),
- Operations (green section), and
- Risk management, standard operating procedures and best practices (blue section).

This document also provides background information on the aircraft and an extensive listing of resources and references.

How to Use the Document

This document was originally drafted as job aids intended to assist FAA field office personnel and operators in the airworthiness certification of these aircraft. As such, some of the phrasing implies guidance to FAA certification personnel. The job aids were intended to be used during the airworthiness certification process to help identify any issues that may hinder the safe certification, maintenance, or operation of the aircraft. The person performing the certification and the applicant would discuss the items in the job aid, inspect documents/records/aircraft, and mitigate any issues. This information would be used to draft appropriate operating limitations, update the aircraft inspection program, and assist in the formulation of adequate operating procedures. There are also references to requesting information from, or providing information to the person applying for an airworthiness certificate. We are releasing this document as drafted, with no further updates and revisions, for the sole purpose of communicating safety information to those involved in the certification, operation, and maintenance of these aircraft. The identified safety issues and recommended mitigation strategies are clear and can be considered as part of the certification, operation, and maintenance of the aircraft.

Attachment 2—Background Information on the F-86

First flown in 1947, the North American F-86 is a first-generation, high-performance transonic jet fighter. It was the first American swept-wing jet fighter. After it entered service with the USAF in 1949, the aircraft was extensively used during the Korean War (1950-1953) and was essential in ensuring air superiority against the Soviet Mig-15.

Over 7,860 F-86s were manufactured between 1949 and 1956, in the U.S, Japan, and Italy. Variants were built in Canada (Canadair CL13 Sabre) and Australia (CAC or Avon Sabre,) bringing the total production run to 9,860. It is the most-produced Western jet fighter in the 1950s and most of the 1960s.

The last F-86s were retired from squadron service with the USAF in 1971. The last NATO F-86F unit (Portuguese Air Force) retired the aircraft in 1980. The last active operational aircraft were retired by the Bolivian Air Force in 1994.

The F-86 was produced as a fighter-interceptor and fighter-bomber. They were powered by a single General Electric J47 (-1, -3, -7, -13, -17, -17B, -27,) a General Electric J73 (-3, -3A, -3E) or an Orenda (10 or 14). Some models were equipped with an afterburner. Australian F-86s were equipped with the Avon engine. The U.S. Navy operated several derivatives of the F-86 under the designation FJ Fury.

There are approximately 50 F-86 aircraft included in the FAA registry, and about 15 are believed to be active or in an airworthy condition. There is significant potential for the F-86 population to grow in the U.S. due to the high number of stored airframes. In addition to the U.S., civil F-86s have or are operating in Australia, Canada, and the UK.



Top, in-flight photograph of the XP-86, the F-86 prototype in 1948. Above, a F-86A of the 51 FIW in Korea in 1951. Source: USAF.



Top, two USAF F-86Fs in flight over Korea after the Korean War in 1954. Source: William Starr. Middle and above, and representing a Korean War aircraft, a civil F-86 at a U.S. airshow in 1994. Source: Mike Brown. FAA.



Top, three civil F-86s in the early 1970s. Above, a Flight Systems, Inc. F-86 at Kadena AFB in the 1970s.

The actual level of airworthiness of the many F-86 flying is unknown, but there are indications that while some owners and operators invest heavily into operating and maintaining their aircraft, others do not. Many have perceived the F-86 as a “simple” aircraft to operate, but it is not, as discussed throughout this document.



The clean lines of the F-86 are well-illustrated in this in-flight photograph of a USAF F-68 in 1954. Source: USAF.

The aircraft's safety record clearly illustrates this mis-representation. As a first generation jet fighter, essentially based on WWII technology, the F-86's operational safety record is marginal to say the least. While in U.S. Air Force service the F-86's accident rate was 44 per 100,000 hours. However, in service with other air forces, the F-86's safety record was improved.

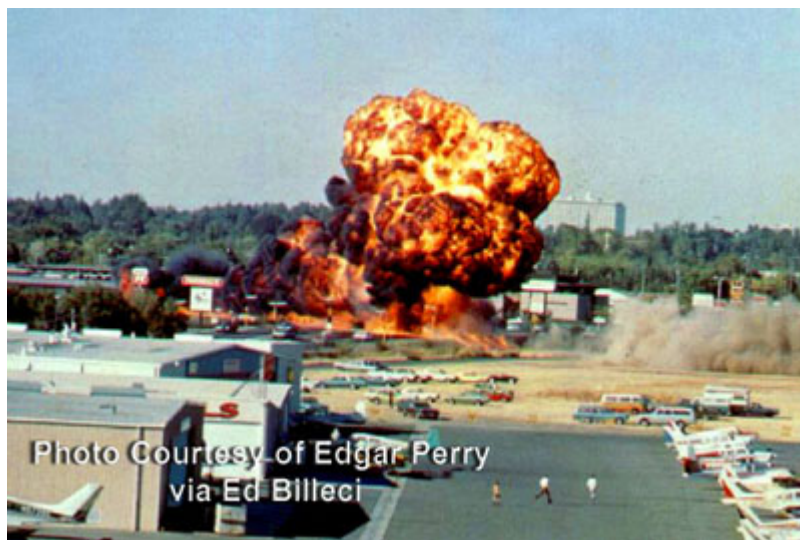
For example, in the Spanish air force, of the 270 F-86 operated, for a total of 400,000 hours, 72 were destroyed in accidents for an accident rate (destroyed airframe) of 18 per 100,000 hours. This number, although lower than the 44 per 100,000 hours experienced by the USAF does not include accidents where the airframe was not destroyed. As a result, the actual accident rate in Spanish Air Force service would be higher (estimated at 25 per 100,000 hours), but still well-below the 44 per 100,000 hours mark in USAF service.

In civil use (U.S), it is estimated that the F-86 accident rate is approximately 60 per 100,000 hours based on 20,000 hours and 12 accidents (1970-2012). These data does not include N-registered F-86s used by DoD, such as those used by the U.S. Army for missile testing and as drones. A further analysis of the data shows that for the 13 years (1993-2006), the accident rate for the F-86 was 131 per 100,000 hours based on a total of 4,550 hours (an average of 10 operating aircraft, 13 years, 35 hours per year per aircraft).

USAF F-86 Accident History									
CLASS A			CLASS B		DESTROYED		FATAL		
YEAR	#	RATE	#	RATE	A/C	RATE	PILOT	ALL	HOURS
CY50	112	134.46	36	43.22	36	43.22	N/A	15	83297
CY51	127	100.70	41	32.51	55	43.61	N/A	18	126117
CY52	180	84.46	57	26.75	75	35.19	N/A	33	213121
CY53	376	80.39	217	46.39	202	43.19	N/A	88	467741
CY54	487	60.92	171	21.39	261	32.65	N/A	113	799451
CY55	380	42.82	64	7.21	247	27.83	N/A	100	887500
CY56	310	37.58	43	5.21	192	23.28	N/A	77	824864
CY57	173	28.25	25	4.08	114	18.61	N/A	49	612468
CY58	116	22.15	22	4.20	77	14.71	25	26	523611
CY59	77	17.47	17	3.86	67	15.20	20	22	440873
CY60	36	15.42	6	2.57	28	11.99	9	9	233501
CY61	21	22.66	25	26.98	16	17.27	0	0	92667
CY62	14	23.54	15	25.22	15	25.22	6	9	59469
CY63	9	15.38	4	6.84	9	15.38	3	3	58511
CY64	6	12.88	1	2.15	6	12.88	2	4	46596
CY65	10	45.60	2	9.12	9	41.04	1	1	21929
CY66	12	80.14	0	0.00	10	66.79	4	6	14973
CY67	1	8.25	0	0.00	1	8.25	0	0	12119
CY68	2	21.01	0	0.00	2	21.01	0	0	9518
CY69	0	0.00	0	0.00	0	0.00	0	0	8588
CY70	0	0.00	0	0.00	0	0.00	0	0	6715
CY71	0	0.00	0	0.00	0	0.00	0	0	2
LIFETIME	2,449	44.18	746	13.46	1,422	25.65	70	573	5,543,631

Source: USAF Safety Center. Below, the fiery result of a 1997 civil F-86 accident in Broomfield, Colorado, near a residential area.





The photos on this page illustrate the 1972 crash of a civil F-86 (N275X) at the Sacramento airport. A total of 22 people were killed when the F-86 failed to become airborne. The F-86 over rotation issue, the adequate runway length requirement, and pilot qualifications are all well-captured in the accident. Source: Christopher Freeze, http://www.check-six.com/Crash_Sites/Sabrejet_crash_site.htm.

Regardless, the accident rate for the F-86 does not compare well to any modern day military type (today's USAF accident rate for fighters is about 2 per 100,000 hours), or many other former military aircraft in civil use for that matter. The high number of mechanical failures, especially engine failures is a great concern. Lack of familiarity with the aircraft both in terms of maintenance (inadequate Aircraft Inspection Program or AIP) and operations (pilot), are also issues for concern.

Aggressive low-altitude maneuvering and loss of control (LOC) are also safety issues that may not have been properly mitigated from an operational standpoint. Mechanical failures with other systems, namely the landing gear and flight control systems system also have to be addressed.

The lethality of the aircraft is also an issue. All of the last 6 F-86 accidents in the U.S. (1993-2006) extracted from the NTSB database were fatal. Very few, if any, former military aircraft in civil use has such a record.

In summary, while the historical value of the F-86 cannot be underestimated, neither can the aircraft's safety and risks issues. Adequate mitigation is required, and the record supports a position that the safety of civil F-86 operations can be enhanced.



Top and middle, USAF F-86s during the Korea War. Source: USAF. Above, a Portuguese Air Force (PAF) F-86F photographed in flight in 1980, the last year of operations of the aircraft as a NATO asset. Source: PAF.

Specifications (F-86F-40-NA)General Characteristics:

- Crew: 1
- Length: 37 ft 1 in
- Wingspan: 37 ft 0 in
- Height: 14 ft 1 in
- Wing area: 313.4 sq ft
- Empty weight: 11,125 lb
- Loaded weight: 15,198 lb
- Max. takeoff weight: 18,152 lb
- Powerplant: 1 × General Electric J47-GE-27 turbojet, 5,910 lb. (maximum thrust at 7.950 rpm for five min) (
- Fuel provisions Internal fuel load: 437 US gallons (1,650 L)), Drop tanks: 2x200 US gallons (760 L) JP-4 fuel

Performance:

- Maximum speed: 687 mph (1,106 km/h) at sea level at 14,212 lb (6,447 kg) combat weight and 599 mph at 35,000 feet (11,000 m) at 15,352 pounds (6,960 kg).
- Stall speed: 124 mph (power off)
- Range: 1,525 mi, (2,454 km)
- Service ceiling: 49,600 ft at combat weight
- Rate of climb: 9,000 ft/min at sea level (
- Wing loading: 49.4 lb/ft²
- lift-to-drag: 15.1
- Thrust/weight: 0.38

Armament:

- Guns: Six 0.50 in (12.7 mm) M2 Browning machine guns (1,602 rounds in total)
- Rockets: variety of rocket launchers; e.g.: 2 Matra rocket pods with 18 SNEB 68 mm rockets per pod
- Bombs: 5,300 lb (2,400 kg) of payload on four external hard-points, bombs were usually mounted on outer two pylons as the inner pairs were plumbed for 2 200 US gallons (760 L) drop tanks which gave the Sabre a more useful range. A wide variety of bombs could be carried (max standard load being two 1,000 lb bombs plus two drop tanks), napalm canisters and could have included a tactical nuclear weapon.

F-86 Production Summary

- NAA built a total of 6,297 F-86s and 1,115 FJs,
- Canadair built 1,815,
- Australian CAC built 112,
- Fiat built 221, and
- Mitsubishi built 300;
- Total Sabre/Fury production of 9,860.



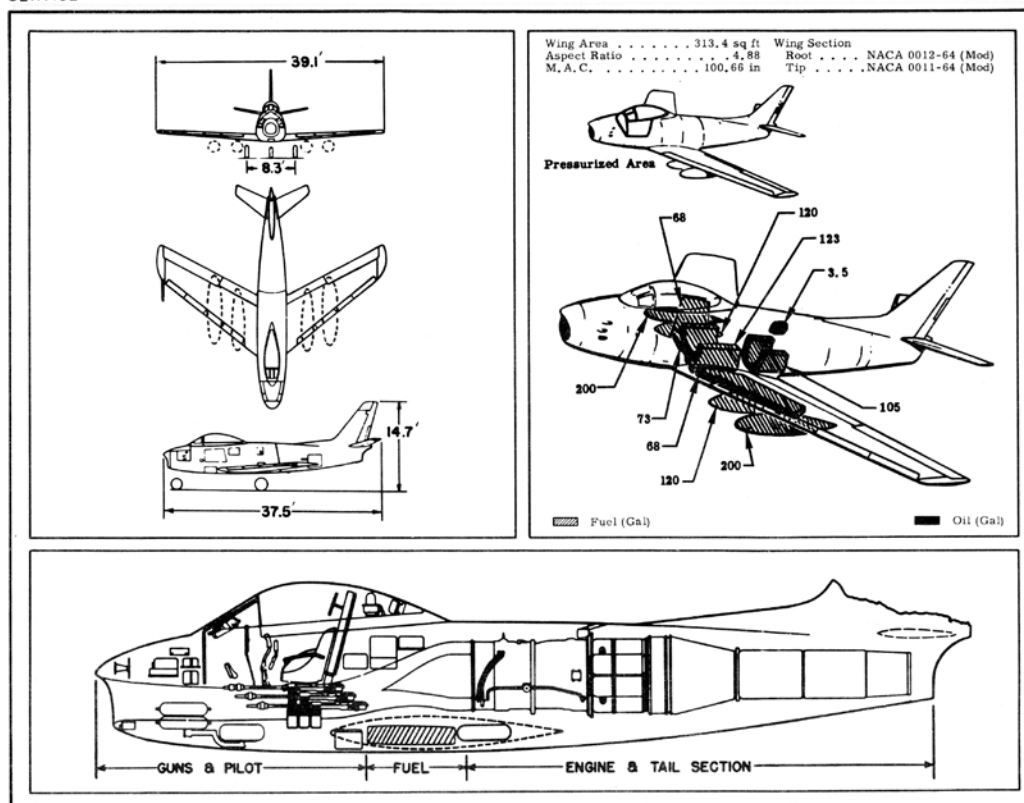
Top, an F-86A displays some of its weapon systems and external stores. Source: USAF. Above, an F-86 awaits restoration. Source: USAF.



Top, a RCAF Canadair CL13 Sabre in the late 1950s. Above, a restored civil Canadian F-86 in 2009. Source: RCAF.

SERVICE

U N C L A S S I F I E D



F-86F-25 thru-40

U N C L A S S I F I E D

1 OCT 56

POWER PLANT

Nr. & Model (1) J47-GE-27
Mfr General Electric
Engine Spec Nr. E-594a
Type Axial
Length 148.0"
Diameter 39.5"
Weight (dry) 2607 lb
Tail Pipe Fixed Area

ENGINE RATINGS

S. L. Static	LB	RPM	MIN
Max:	5910	7950	5
Mil:	5910	7950	30
Nor:	5270	7630	Cont

Note: Ratings are with inlet screens retracted.

Mission and Description

Navy Equivalent: None Mfr's Model: NA-176, -191, -203 & -227

The principal mission of the F-86F airplane is Fighter-Bomber. Special features of this airplane are electrically operated flaps, hydraulically operated speed brakes, hydraulic power-operated irreversible controls with artificial feel for the all-movable horizontal tail and ailerons. The cockpit is provided with 2.75 or 5 psi differential pressurization, adequate heating and cooling, a jettisonable canopy, an ejection-type seat, anti-G suit provision, and a low pressure oxygen system. A type A-4 Gun-Bomb-Rocket sight is provided and is used in conjunction with the radar ranging equipment. Provisions are made for carrying either bombs or rockets externally. The 200 gal fuel tanks carried by this airplane are standard Air Force tanks that have force ejection pylons.

Development

All F-86F-25 thru -35 aircraft are being modified to incorporate the combination slatted-extended leading edge configuration and wing tip extensions. The F-86F-40 aircraft will have these modifications accomplished before delivery.

Contract approved (F-86F-25) May 52
First flight (F-86F-25) Oct 52
First delivery (F-86F-25) Oct 52
Production Completion (F-86F-40) Dec 56

WEIGHTS

Loading	Lb	L. F.
Empty	11,125 (C)	
Basic	11,585 (C)	
Design	13,395	7.33
Combat	15,681	7.0
Max T.O.	20,611	2.0
Max in Flt	20,611	5.0
Max Land	20,611	2.0

(C) Calculated
* For Basic Mission
† Limited by Mission

FUEL

Location	Nr. Tanks	Gal
Wgs*	3	209
Fus*	2	228
Wgs, drop (combat) 2		400
Wgs, drop (ferry) 2		240
Total		1077

Grade JP-4
Specification MIL-F-5624
*Self-Sealing

OIL

Fuselage	1	(tot) 3.5
Grade		1105
Specification		MIL-L-6081A

DIMENSIONS

Wing Span	39.1'
Incidence (root)	1°
(tip)	10°14'
Dihedral	3°
Sweepback(25% chord)	35°41'
Length	37.5'
Height	14.7'
Tread	8.3'

BOMBS

No.	Class (lb)
2	WW II (Box Fin)
2	1000
2	500
2	250
2	Interim (Conical Fin)
2	1000
2	500
2	250
2	1000
2	750
2	500
Max Bomb Load	2000 lb

GUNS

No.	Type	Size	Rds ea	Location
6	M-3	.50 cal.	300	Fus, fwd
Gun Camera				(1) N-9

ROCKETS

No.	Size	Type	Location
8*	5"	HVAR	Wings

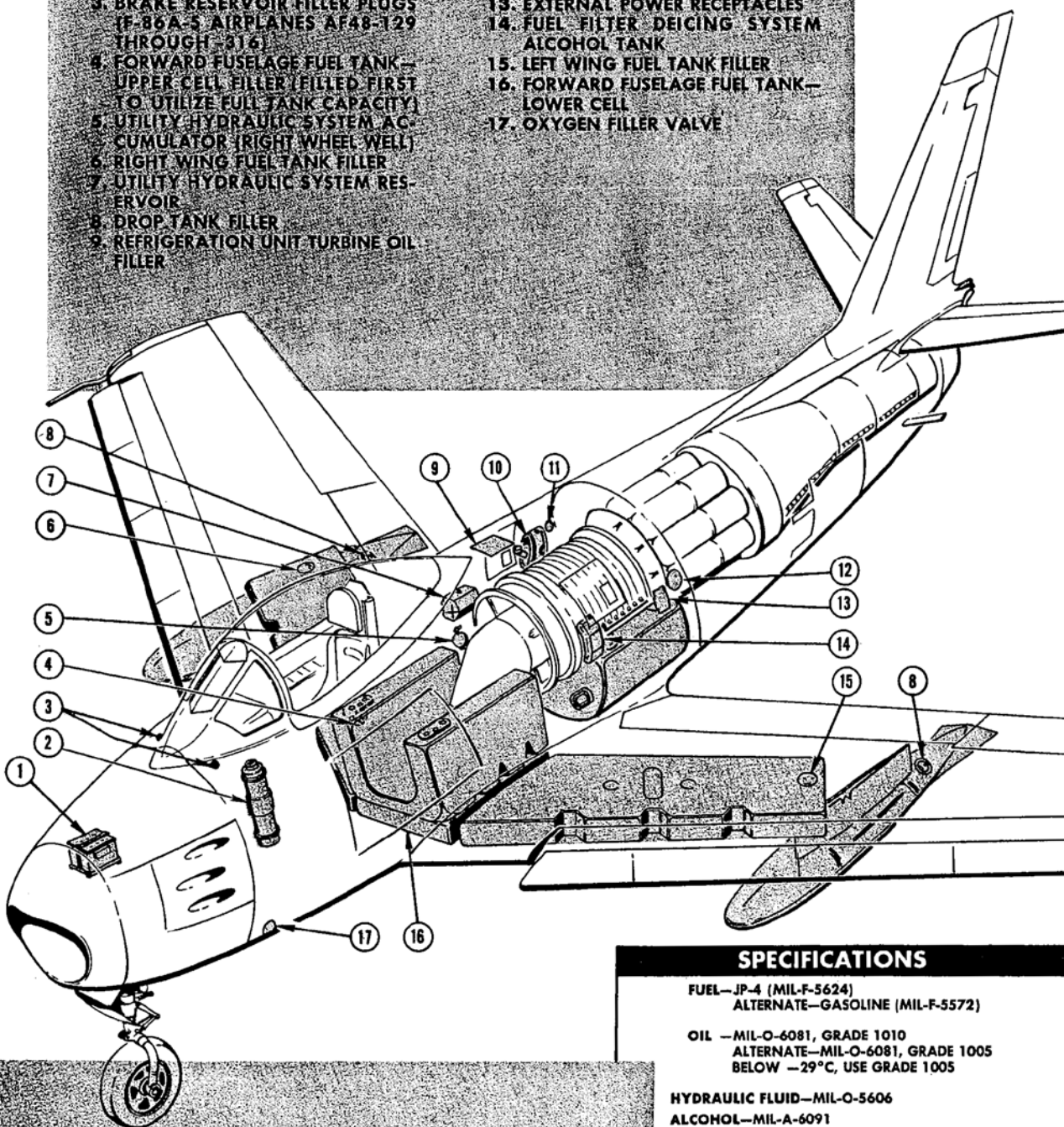
*Provisions for 16 x 5" rockets

ELECTRONICS

UHF Command	AN/ARC-27
IFF	AN/APX-6A
Radio Compass	AN/ARN-6
Radar Ranging Equip. AN/APG-30A	

servicing diagram

1. BATTERY
2. NOSE GEAR EMERGENCY EXTENSION SYSTEM ACCUMULATOR (RIGHT SIDE)
3. BRAKE RESERVOIR FILLER PLUGS (F-86A-5 AIRPLANES AF48-129 THROUGH -316)
4. FORWARD FUSELAGE FUEL TANK—UPPER CELL FILLER (FILLED FIRST TO UTILIZE FULL TANK CAPACITY)
5. UTILITY HYDRAULIC SYSTEM ACCUMULATOR (RIGHT WHEEL WELL)
6. RIGHT WING FUEL TANK FILLER
7. UTILITY HYDRAULIC SYSTEM RESERVOIR
8. DROP TANK FILLER
9. REFRIGERATION UNIT TURBINE OIL FILLER
10. ENGINE OIL TANK
11. HYDRAULIC EXTERNAL POWER CONNECTIONS
12. AFT FUSELAGE FUEL TANK FILLER
13. EXTERNAL POWER RECEPTACLES
14. FUEL FILTER DEICING SYSTEM ALCOHOL TANK
15. LEFT WING FUEL TANK FILLER
16. FORWARD FUSELAGE FUEL TANK—LOWER CELL
17. OXYGEN FILLER VALVE



SPECIFICATIONS

FUEL—JP-4 (MIL-F-5624)
ALTERNATE—GASOLINE (MIL-F-5572)

OIL —MIL-O-6081, GRADE 1010
ALTERNATE—MIL-O-6081, GRADE 1005
BELOW -29°C , USE GRADE 1005

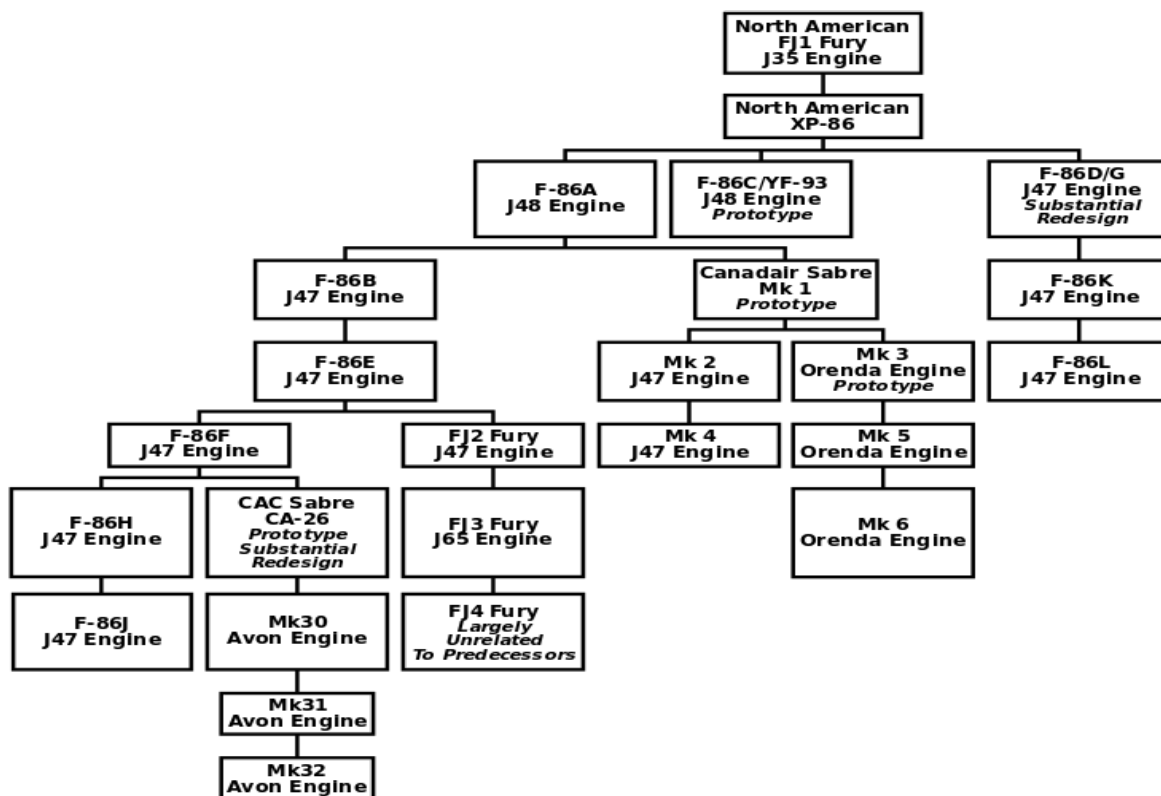
HYDRAULIC FLUID—MIL-O-5606

ALCOHOL—MIL-A-6091

OXYGEN—FED SPEC-BB-O-925

F-86A-1-00-4B

F-86 Family Tree



Source: http://en.wikipedia.org/wiki/File:Sabre_familytree.svg



USAF F-86F undergoing an engine change outdoors in Korea in 1953. Source: USAF.

main differences table					
F-86 SERIES	F-86A	F-86D, K, AND L	F-86E	F-86F	F-86H
ITEM	A	D, K, and L	E	F	H
Engine	J47-GE-7 or -13	J47-GE-17, -17B, or -33 with afterburner	J47-GE-13	J47-GE-27	J73-GE-3 Series
Engine Control	Mechanical	Electronic	Mechanical	Mechanical	Hydromechanical
Automatic Pilot	No	Yes	No	No	No
Horizontal Tail	Conventional	Single, controllable surface	Controllable stabilizer and elevator	Controllable stabilizer and elevator	Controllable stabilizer and elevator
Aileron & Horizontal Tail Control	Conventional and hydraulic boost	Full-power hydraulic irreversible control	Full-power hydraulic irreversible control	Full-power hydraulic irreversible control	Full-power hydraulic irreversible control
Aileron & Horizontal Tail Artificial Feel System	No	Yes	Yes	Yes	Yes
Armament	Machine guns, bombs, rockets, or chemical tanks	F-86D AND F-86L: Rockets in fuselage package F-86K: 20mm guns	Machine guns, bombs, rockets, or chemical tanks	Machine guns, bombs, rockets, or special store	Machine guns, bombs, rockets, or special store
Windshield	"V"	Flat	"V" or flat	Flat	Flat
Canopy Ejection Control	Right handgrip on seat Either handgrip (some airplanes)	Right handgrip on seat Either handgrip (some airplanes)	Right handgrip on seat Either handgrip (some airplanes)	Right handgrip on seat Either handgrip (some airplanes)	Either handgrip on seat
Canopy	Sliding	Clamshell	Sliding	Sliding	Clamshell
Oxygen Regulator	A-14 or D-2	D-1, D-2, D-2A, or MD-1	A-14 or D-2	D-1, D-2, or D-2A	D-2

North American F-86 Versions and Variants (Land based)**XF-86**

Three prototypes, originally designated XP-86, North American model NA-140.

YF-86A

This was the first prototype fitted with a General Electric J47 turbojet engine.

F-86A

554 built, North American model NA-151 (F-86A-1 block and first order of A-5 block) and NA-161 (second F-86A-5 block).

DF-86A

A few F-86A conversions as drone directors.

RF-86A

Eleven F-86A conversions with three cameras for reconnaissance.

F-86B

188 ordered as upgraded A-model with wider fuselage and larger tires but delivered as F-86A-5, North American model NA-152.

F-86C

Original designation for the YF-93A, two built, 48-317 & 48-318, order for 118 cancelled, North American model NA-157.

YF-86D

Prototype all-weather interceptor originally ordered as YF-95A, two built but designation changed to YF-86D, North American model NA-164

F-86D

Production transonic all-weather search-radar equipped interceptor originally designated F-95A, 2,506 built. The F-86D had only 25 percent commonality with other Sabre variants, with a larger fuselage, larger afterburning engine, and a distinctive nose radome. See North American F-86D Sabre.

F-86E

Improved flight control system and an "all-flying tail" (This system changed to a full power-operated control with an "artificial feel" built into the aircraft's controls to give the pilot forces on the stick that were still conventional, but light enough for superior combat control. It

improved high-speed maneuverability); 456 built, North American model NA-170 (F-86E-1 and E-5 blocks), NA-172, essentially the F-86F airframe with the F-86E engine (F-86E-10 and E-15 blocks); 60 of these built by Canadair for USAF (F-86E-6).

F-86E(M)

Designation for ex-RAF Sabres diverted to other NATO air forces.

QF-86E

Designation for surplus RCAF Sabre Mk. Vs modified to target drones.

F-86F

Updated engine and larger "6-3" wing without leading edge slats, 2,239 built; North American model NA-172 (F-86F-1 through F-15 blocks), NA-176 (F-86F-20 and -25 blocks), NA-191 (F-86F-30 and -35 blocks), NA-193 (F-86F-26 block), NA-202 (F-86F-35 block), NA-227 (first two orders of F-86F-40 blocks comprising 280 aircraft which reverted to leading edge wing slats of an improved design), NA-231 (70 in third F-40 block order), NA-238 (110 in fourth F-40 block order), and NA-256 (120 in final F-40 block order); 300 additional airframes in this series assembled by Mitsubishi in Japan for Japanese Air Self-Defense Force. Sabre Fs had much improved high-speed agility, coupled with a higher landing speed of over 145 mph (233 km/h). The F-35 block had provisions for a new task: the nuclear tactical attack with one of the new small "nukes" ("second generation" nuclear ordnance). The F-40 had a new slatted wing, with a slight decrease of speed, but also a much better agility at high and low speed with a landing speed reduced to 124 mph (200 km/h). The USAF upgraded many of previous F versions to the F-40 standard.

F-86F-2

Designation for 10 aircraft modified to carry the M39 cannon in place of the M3 .50 caliber machine gun "six-pack". Four F-86E and six F-86F were production-line aircraft modified in October 1952 with enlarged and strengthened gun bays, then flight tested at Edwards Air Force Base and the Air Proving Ground at Eglin Air Force Base in November. Eight were shipped to Japan in December, and seven forward-deployed to Kimpo Airfield as "Project GunVal" for a 16-week combat field trial in early 1953. Two were lost to engine compressor stalls after ingesting excessive propellant gases from the cannons.

QF-86F

About 50 former Japan Self-Defense Forces (JASDF) F-86F airframes converted to drones for use as targets by the U.S. Navy.

RF-86F

Some F-86F-30s converted with three cameras for reconnaissance; also 18 Japan Self-Defense Forces (JASDF) aircraft similarly converted.

TF-86F

Two F-86F converted to two-seat training configuration with lengthened fuselage and slatted wings under North American model NA-204.

YF-86H

Extensively redesigned fighter-bomber model with deeper fuselage, updated engine, longer wings and power-boosted tail plane, two built as North American model NA-187.

F-86H

Production model, 473 built, with Low Altitude Bombing System (LABS) and provision for nuclear weapon, North American model NA-187 (F-86H-1 and H-5 blocks) and NA-203 (F-86H-10 block).

QF-86H

Target conversion of 29 airframes for use at United States Naval Weapons Center.

F-86J

Single F-86A-5-NA, 49-1069, flown with Orenda turbojet under North American model NA-167 – same designation reserved for A-models flown with the Canadian engines but project not proceeded with.



A rare North American RF-86A. The RF-86 was the reconnaissance version of the aircraft. Source : USAF.



Ground and aerial views of USAF F-86Ds. The F-86D was equipped with radar and an afterburning J93 engine. Source : USAF.

CAC Sabre (Australia)

Two types based on the U.S. F-86F were built under license by the Commonwealth Aircraft Corporation (CAC) in Australia, for the Royal Australian Air Force as the CA-26 (one prototype) and CA-27 (production variant). The RAAF operated the CA-27 from 1956 to 1971. Ex-RAAF Avon Sabres were operated by the Royal Malaysian Air Force between 1969 and 1972. From 1973 to 1975, 23 Avon Sabres were donated to the Indonesian Air Force (TNI-AU); five of these were ex-Malaysian aircraft. The CAC Sabres included a 60% fuselage redesign, to accommodate the Rolls-Royce Avon Mk 26 engine, which had roughly 50% more thrust than the J47, as well as 30 mm Aden cannons and AIM-9 Sidewinder missiles. As a consequence of its powerplant, the Australian-built Sabres are commonly referred to as the Avon Sabre. CAC manufactured 112 of these aircraft.

CA-27 marks:

- Mk 30: 21 built, wing slats, Avon 20 engine.
- Mk 31: 21 built, 6–3 wing, Avon 20 engine.
- Mk 32: 69 built, four wing pylons, F-86F fuel capacity, Avon 26 engine.

Canadair F-86

The F-86 was also manufactured by Canadair in Canada as the CL-13 Sabre to replace its de Havilland Vampires, with the following production models:

Sabre Mk 1: One built, prototype F-86A.

Sabre Mk 2: 350 built, F-86E-type, 60 to USAF, three to RAF, 287 to RCAF.

Sabre Mk 3: One built in Canada, test-bed for the Orenda jet engine.

Sabre Mk 4: 438 built, production Mk 3, 10 to RCAF, 428 to RAF as Sabre F 4.

Sabre Mk 5: 370 built, F-86F-type with Orenda engine, 295 to RCAF, 75 to *Luftwaffe*.

Sabre Mk 6: 655 built, 390 to RCAF, 225 to *Luftwaffe*, six to Colombia and 34 to South Africa.

North American FJ Fury (U.S. Navy)

North American FJ Fury may refer to several members of a group of fighter and fighter-bomber aircraft, built by North American Aviation for the US Navy, and related in varying degrees to the F-86 Sabre this firm produced for the US Air Force:

- North American FJ-1 Fury, the original straight-winged jet fighter model, 31 produced. It formed the basis for the development of the swept-wing F-86 Sabre. The FJ-1 was powered by the Allison J35-A-2.
- North American FJ-2/-3 Fury, The FJ-2 was powered by the General Electric J47-GE-2. The FJ-3 was powered by the Wright J65-W-4. Navalized versions of the F-86 Sabre; 741 produced.
- North American FJ-4 Fury, a substantial redesign of the FJ-3 Fury; 374 produced. The FJ-4 was powered by the Wright J65-W-16A.



Top, a U.S. Navy FJ-3 Fury. Source: U.S. Navy. Above, a Portuguese Air Force F-86F. Source: Jorge Ruivo. Copyright © 2011. Used with permission.

Former F-86 Operators (Overview)

Argentine Air Force: Acquired 28 F-86Fs, 26 September 1960, FAA s/n CA-101 through CA-128. The Sabres were already on *reserve* status at the time of the Falklands War but were reinstated to active service to bolster air defenses against possible Chilean involvement. Finally retired in 1986.

Belgian Air Force: 5 F-86F Sabres delivered, no operational unit

Bolivian Air Force: Acquired 10 F-86Fs from Venezuelan Air Force October 1973, assigned to Brigada Aérea 21, Grupo Aéreo de Caza 32, they were reported to have finally been retired from service in 1994, making them the last Sabres on active front line service anywhere in the world.

Royal Canadian Air Force (RCAF)

Colombian Air Force: Acquired two F-86Fs from Spanish Air Force (s/n 2027/2028), one USAF F-86F (s/n 51-13226), and other six Canadair Mk.6; assigned to Escuadron de Caza-Bombardero.

Ethiopian Air Force: Acquired 14 F-86Fs in 1960.

German Air Force (Luftwaffe). See *Canadair F-86* above.

Imperial Iranian Air Force: Acquired an unknown number of F-86Fs.

Honduran Air Force: Acquired four F-86K from Venezuela (1970) and 10 CL.13 Mk2 (F-86E) from Yugoslavia

Aeronautica Militare Italiana: Received first 179 Canadair Sabre MK 4 (F-86E) and later 121 FIAT-produced F-86Ks and acquired between 1955 and 1958, plus 120-ex USAF F-86Ks.

Japanese Air Self-Defense Force (JASDF): Acquired 180 U.S. F-86Fs, 1955–1957. Mitsubishi built 300 F-86Fs under license 1956–1961, and were assigned to 10 fighter hikōtai or squadrons. A total of 18 F-models were converted to reconnaissance version in 1962. Some aircraft were returned to the Naval Air Weapons Station China Lake, California, as drones.

Royal Norwegian Air Force: Acquired 115 F-86Fs, 1957–1958; and assigned to seven Norwegian Squadrons, Nos. 331, 332, 334, 336, 337, 338 and 339.

Pakistani Air Force: Acquired 102 U.S.-built F-86F-35-NA and F-86F-40-NAs, last of North American Aviation's production line, 1954–1960s.

Peruvian Air Force: Acquired 26 U.S.-built F-86Fs in 1955, assigned to Escuadrón Aéreo 111, Grupo Aéreo No.11 at Talara air force base. Finally retired in 1979.

Philippine Air Force: Acquired 50 F-86Fs in 1957. Retired in early 1970s.

Portugal Air Force: Acquired 50 U.S.-built F-86Fs, 1958. The last aircraft were retired in 1980, the last NATO operator of the type.

Republic of China Air Force: Acquired 320 U.S.-built F-86Fs, 7 RF-86Fs, 18 F-86Ds, The 18 F-86Ds back to U.S. military and US send 6 to Republic of Korea Air Force, 8 to Philippine Air Force in 1966.

Royal Saudi Air Force: Acquired 16 U.S.-built F-86Fs in 1958 and three Fs from Norway in 1966; and assigned to RSAF No. 7 Squadron at Dharhran.

South African Air Force: Acquired on loan 22 U.S.-built F-86F-30s during the Korean War.

Republic of Korea Air Force: Acquired 122 U.S.-built F-86Fs and RF-86Fs, beginning 20 June 1955; and assigned to ROKAF 10th Wing.

Spanish Air Force: Acquired 270 U.S.-built F-86Fs, 1955–1958; designated C.5s and assigned to 5 wings: Ala de Caza 1, 2, 4, 5, and 6. Retired 1972.

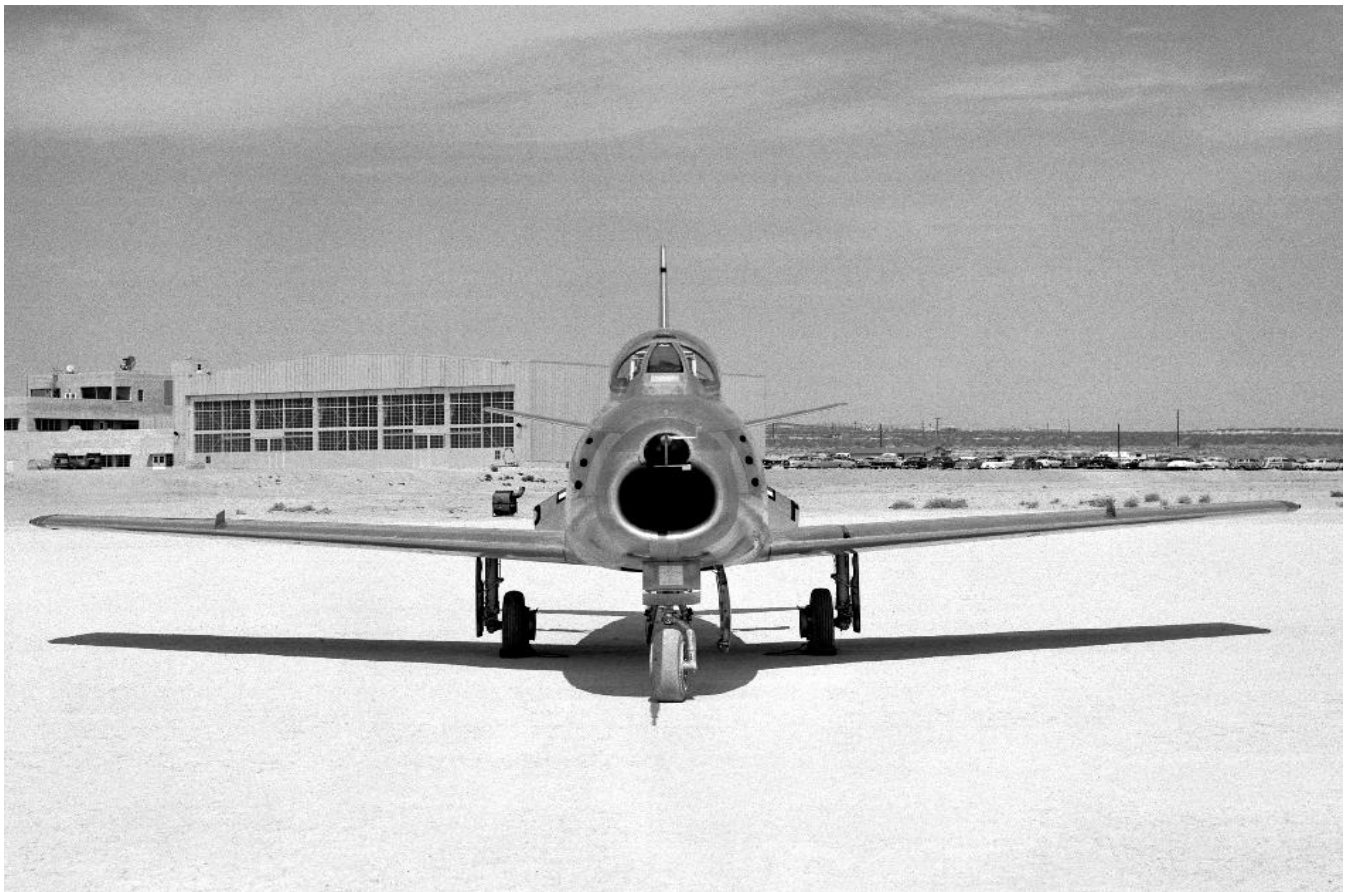
Royal Thai Air Force: Acquired 40 U.S.-built F-86Fs, 1962; assigned to RTAF Squadrons, Nos. 12 (Ls), 13, and 43.

Tunisian Air Force: Acquired 15 used U.S.-built F-86F in 1969.

TurkeyTurkish Air Force: Acquired 12 U.S.-built F-86Fs.

Venezuelan Air Force: Acquired 30 U.S.-built F-86Fs, October 1955 – December 1960; and assigned to one group, Grupo Aéreo De Caza No. 12, three other squadrons.

Yugoslav Air Force: Acquired 121 Canadair CL-13s and F-86Es, operating them in several fighter aviation regiments between 1956 and 1971.



NASA F-86 at the Dryden Flight Research Center. Source: NASA.

F-86s in the FAA Registry (June 2012)

Manufacturer Model Code	Number of Aircraft Assigned	Manufacturer Name	Model Name
0561263	<u>IDAHO - 1</u> Total = 1	SMITH ELMER W	AF86-1
05616F6	<u>ILLINOIS - 1</u> Total = 1	COLEMAN WARBIRO MUSEUM INC	CWF86-F-30-NA
6401702	<u>FLORIDA - 1</u> <u>OREGON - 1</u> Total = 2	NORTH AMERICAN	F-86
6401703	<u>OKLAHOMA - 1</u> Total = 1	NORTH AMERICAN/NORTH WOODS ACF	F-86
6401704	<u>WASHINGTON - 2</u> Total = 2	NORTH AMERICAN	F-86A
6401710	Total = 0	NORTH AMERICAN	F-86D
6401713	Total = 0	NORTH AMERICAN	F-86E
056221R	<u>TEXAS - 1</u> Total = 1	BURCHINAL I N	F86E
1900812	<u>CALIFORNIA - 6</u> <u>MONTANA - 1</u> <u>NEVADA - 1</u> <u>NEW MEXICO - 1</u> <u>NORTH CAROLINA - 1</u> <u>OKLAHOMA - 2</u> <u>TENNESSEE - 1</u> <u>TEXAS - 3</u> <u>WASHINGTON - 2</u> <u>WYOMING - 1</u> Total = 19	CANADAIR	F-86E MK.6
6401714	<u>CALIFORNIA - 2</u> <u>FLORIDA - 1</u> <u>INDIANA - 1</u> <u>NEVADA - 1</u> <u>PENNSYLVANIA - 1</u> <u>TEXAS - 3</u> <u>WASHINGTON - 1</u> Total = 10	NORTH AMERICAN	F-86F
6401715	<u>CALIFORNIA - 1</u> Total = 1	NORTH AMERICAN/SHARPE	F86F
6401728	<u>MINNESOTA - 1</u> Total = 1	NORTH AMERICAN	F-86H
6401744	Total = 0	NORTH AMERICAN	F-86K
6401746	<u>CALIFORNIA - 1</u> <u>HAWAII - 1</u> <u>NEVADA - 1</u> Total = 3	NORTH AMERICAN	F-86L
05620FJ	<u>TEXAS - 1</u> Total = 1	BURCHINAL I N JR	F86-L
1900822	<u>ALABAMA - 3</u> <u>CALIFORNIA - 3</u> <u>NEVADA - 1</u> <u>WISCONSIN - 1</u> <u>WYOMING - 1</u> Total = 9	CANADAIR	F-86 MK.5

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Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
F-86 Preliminary and General Airworthiness Inspection Issues			
1.	Aviation Safety (AVS) Safety Management System (SMS) Guidance	Use the AVS SMS guidance as part of the airworthiness certification process, as it supplements the existing Code of Federal Regulations (CFR). FAA Order VS8000.367 (May 14, 2008) and FAA Order VS8000.369 (September 30, 2008) are the basis for, but not limited to (1) identifying hazards and making or modifying safety risk controls, which are promulgated in the form of regulations, standards, orders, directives, and policies, and (2) issuing certificates. AVS SMS is used to assess, verify, and control risks, and safety risk management is integrated into applicable processes. Appropriate risk controls or other risk management responses are developed and employed operationally. Safety risk management provides for initial and continuing identification of hazards and the analysis and assessment of risk. The FAA provides risk controls through activities such as the promulgation of regulations, standards, orders, directives, advisory circulars (AC), and policies. The safety risk management process (1) describes the system of interest, (2) identifies the hazards, (3) analyzes the risk, (4) assesses the risk, and (5) controls the risk.	
2.	Aircraft Familiarization	Become familiar with the aircraft before initiating the certification process. One of the first steps in any aircraft certification is to be familiar with the aircraft in question. Such knowledge, including technical details, is essential in establishing a baseline as the certification process moves forward.	
3.	Preliminary Assessment	Conduct a preliminary assessment of the aircraft to determine condition and general airworthiness. A Manufacturing Inspection District Office (MIDO) inspector may seek Flight Standards District Offices (FSDO) support as part of this process. Coordination between the offices may be essential in ensuring adequate technical expertise.	
4.	Main Safety Issues	<p>The main goal of this document is to assist the FAA in eliminating preventable accidents and those accidents and incidents caused by well-known problems that were either not fixed operationally or require specific mitigation to be contained. In other words, unnecessary risks must be mitigated. This document addresses the following general safety concerns regarding former military high-performance aircraft</p> <ul style="list-style-type: none"> • Lack of consideration of inherent and known design failures; • Several single-point failures; • Lack of consideration for operational experience, including accident data and trends; • Operations outside the scope of the airworthiness certificate being sought; • Insufficient flight test requirements; • Unsafe and untested modifications; • Operations over populated areas (the safety of the non-participating public has not been properly addressed in many cases); • Operations from unsuitable airports; • High-risk passenger carrying activities taking place; • Ejection seat safety and operation not adequately addressed; • Weak maintenance practices to address low reliability of aircraft systems and engines; • Ignoring required inspection schedules and procedures; • Limited pilot qualifications, proficiency, and currency; • Weapon-capable aircraft not being demilitarized, resulting in unsafe conditions; • Extensive brokering; • Extensive use of unqualified Designated Airworthiness Representatives (DAR); • Accidents and serious incidents not being reported; and • Inadequate accident investigation data. 	

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5.	Condition for Safe Operation	This is an initial determination by an FAA inspector or authorized representative of the Administrator that the overall condition of an aircraft is conducive to safe operations. This refers to the condition of the aircraft relative to wear and deterioration. The FAA inspector will make an initial determination as to the overall condition of the aircraft. The aircraft items evaluated depend on information such as aircraft make, model, age, type, completeness of maintenance records of the aircraft, and the overall condition of the aircraft.	
6.	Denial	The FAA will provide a letter to the applicant stating the reason(s) for denial and, if feasible, identify which steps may be accomplished to meet the certification requirements if the aircraft does not meet them and the special airworthiness certificate is denied. Should this occur, a copy of the denial letter will be attached to FAA Form 8130-6 and forwarded to AFS-750, and made a part of the aircraft's record.	
7.	Potential Reversion Back to Phase I	Notify the applicant that certain modifications to the aircraft will invalidate Phase II. These include: (a) structural modifications, (b) aerodynamic modifications, including externally mounted equipment except as permitted in the limitations issued, and (c) change of engine make, model, or power rating (thrust or horsepower). The owner/operator may return the aircraft to Phase I to flight test specific items as required. However, major modifications such as those listed above may require new operating limitations. Phase I may have to be expanded as well. In August 2012, the National Transportation Safety Board (NTSB) issued safety recommendations concerning a fatal accident of an experimental high-performance aircraft that had undergone extensive modifications. The NTSB noted "the accident airplane had undergone many structural and flight control modifications that were undocumented and for which no flight testing or analysis had been performed to assess their effects on the airplane's structural strength, performance, or flight characteristics. The investigation determined that some of these modifications had undesirable effects. For example, the use of a single, controllable elevator trim tab (installed on the left elevator) increased the aerodynamic load on the left trim tab (compared to a stock airplane, which has a controllable tab on each elevator). Also, filler material on the elevator trim tabs (both the controllable left tab and the fixed right tab) increased the potential for flutter because it increased the weight of the tabs and moved their center of gravity aft, and modifications to the elevator counterweights and inertia weight made the airplane more sensitive in pitch control. It is likely that, had engineering evaluations and diligent flight testing for the modifications been performed, many of the airplane's undesirable structural and control characteristics could have been identified and corrected." As part of the probable cause, the NTSB stated that "contributing to the accident were the undocumented and untested major modifications to the airplane and the pilot's operation of the airplane in the unique air racing environment without adequate flight testing." As a result of this investigation, the NTSB issued safety recommendations, including requiring "aircraft owners to provide an engineering evaluation that includes flight demonstrations and analysis within the anticipated flight envelope for aircraft with any major modification, such as to the structure or flight controls." Refer to <i>Modifications</i> and <i>Phase I Flight Testing</i> below.	
8.	Identify F-86 Version and Sub-Variants	Identify the version and variant (series) of the F-86 aircraft in question. There are numerous and major differences among F-86 aircraft, not just in terms of engines but major systems and design features, especially the Canadian types. These differences and their impact on the airworthiness of the aircraft are discussed throughout this document. One of the main issues is to determine if the aircraft is either an American-made F-86 or an Ex-RCAF (Royal Canadian Air Force) aircraft. This would govern what standards, USAF or RCAF, would apply.	
9.	Major Structural Components	Ask the applicant to identify and document the origin, condition, and traceability of major structural components.	
10.	Aircraft Records	Request and review the applicable military and civil aircraft records, including aircraft and engine logbooks. Canadian examples include: CF 351 <i>Airframe Time and Landing Record</i> , CF 349 <i>Aircraft Un-Serviceability Record</i> , CF 343 <i>Aircraft / Engine Second Level Inspection Record and Certificate</i> .	
11.	Data Plate, Block Number and Serial Number	Verify the military identification plate is installed. Record all information contained on the identification plate. Block number and serial number also need to be identified.	
12.	Technical Order (TO) 00-5-1, AF Technical Order System	If applicable, become familiar with TO 00-5-1, AF Technical Order System, dated May 1, 2011. This document provides guidance in the USAF TO system, which may guide much of the documentation associated with the aircraft.	

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13.	Aircraft Ownership	Establish and understand the aircraft's ownership status, which sets the stage for many of the responsibilities associated with operating the aircraft safely. There are many cases where former military aircraft are leased from other entities, and this can cloud the process. For example, if the aircraft is leased, the terms of the lease may be relevant as part of the certification because the lease terms may restrict what can be done to the aircraft and its operation for safety reasons.	
14.	FAA Records Review	Review the existing FAA airworthiness and registration files (EDRS) and search the Program Tracking and Reporting Subsystem (PTRS) for safety issue(s) and incidents.	
15.	FAA Form 8100-1	Use FAA Form 8100-1 to document the airworthiness inspection. Using this form facilitates the listing of relevant items to be considered, those items' nomenclature, any reference (that is, NATO manual; FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products; regulations) revision, satisfactory or unsatisfactory notes, and comments. Items to be listed include but are not limited to— <ol style="list-style-type: none"> 1. FAA Form 8130-6; 2. 14 CFR § 21.193; 3. FAA Form 8050-1; 4. 14 CFR § 45.11(a); 5. FAA Order 8130.2, paragraphs 4002a(7) and (10), 4002b(5), 4002b(6), 4002b(8), 4111c, and 4112a(2); 6. 14 CFR § 91.205; 7. § 91.417(a)(2)(i), airframe records and total time, overhaul; and 8. § 91.411/91.413, altimeter, transponder, altitude reporting, static system test. 	
16.	Functionality Check	Ask the applicant to prepare the aircraft for flight, including all preflight tasks, startup, run-up, and taxi.	
17.	Accident and Incident Data System	Review the NTSB accident database and the FAA's Accident and Incident Data System for the aircraft type accidents and incidents. Refer to http://ntsb.gov and http://www.asias.faa.gov .	
18.	Accident and Incident History	Ask the applicant to provide any data concerning all accidents and/or incidents involving the aircraft.	
19.	Adequate Manuals and Related Documentation	Ensure the existence of a complete set of the applicable USAF manuals, such as flight manuals, inspections and maintenance manuals, and engine manuals. Typically, this may involve over 100 such documents. An operator also needs to have the applicable technical orders (TO) to address known issues related to airworthiness, maintenance, and servicing. Examples include: <i>Flight Manual, Maintenance Manual, Inspection Requirements Handbook, Fuel System and Utility Systems Maintenance Handbook, Illustrated Parts Breakdown, Wiring Data Maintenance Instructions, Structural Repair Manual, Electrical and Instrument Systems Maintenance Handbook, Engine Electronic Control System Maintenance Handbook</i> .	
20.	Operational Supplements	Ensure the owner/operator has a complete set of the applicable USAF operational supplements to safely operate a former military high-performance aircraft.	
21.	Availability of Documents listed in <i>North American F-86 Aircraft List of Applicable Publication Manual</i>	Review the aircraft inspection program (AIP) to verify compliance with the applicable version of <i>North American F-86 Aircraft List of Applicable Publication Manual</i> . This document contains the applicable F-86 Technical Orders. Note: Where applicable, equivalent Canadian Armed Forces documents such as engineering orders are acceptable.	

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22.	UK CAA F-86 Airworthiness Approval Notes	Relevant UK CAA Airworthiness Approval Notes for the F-86 are extremely important for the whole airworthiness process. The airworthiness certification of F-86 aircraft without regards to these documents would not be prudent. These documents, which are aircraft-specific, contain the terms and conditions for F-86 operations in the UK. They include details on the specific aircraft and detailed technical information on the different versions and variants of the F-86. They also address major airworthiness issues, such as inspections, required documentation, relevant previous military requirements, and, in some cases, airworthiness developments since the aircraft was phased out of military service. UK CAA Airworthiness Notes can be found at http://www.caa.co.uk/application.aspx?catid=340&pagetype=65&appid=10 .	
23.	North American FJ Fury (Applicability)	Ask whether the aircraft is a U.S. Navy FJ Series aircraft. If so, and only if the aircraft is a FJ-2, would this F-86 document (Job Aid) apply. All other versions of the aircraft, namely the FJ-1, FJ-3, and FJ-4 are not covered herein. This is because the FJ-2 is essentially a nasalized version of the F-86 while the others are either an early straight wing production (very different) while the later FJ-3 and FJ-4 are essentially new aircraft (i.e. J65 engine) which only look like F-86s.	
24.	Canadian F-86s (Civil)	Ask whether the aircraft has been imported from Canada. If so, ask for Transport Canada's airworthiness and registration records. This is important, especially the operating limitations, because it established a baseline for the airworthiness certification of the aircraft. Note: The certification basis for these aircraft is CAR Standard 507.03 (5)(b) <i>Ex-military Aircraft</i> , 507D, and (AMA) 507D/2 <i>Airworthiness Manual Advisory</i> . Canadian F-86s are likely to have a Special Certificate of Airworthiness – Limited. For additional details on 507, see http://www.tc.gc.ca/eng/civilaviation/regserv/cars/ .	
25.	Australin F-86s (Civil)	Ask whether the aircraft has been imported from Australia. If so, ask for that country's CAA airworthiness and registration records. This is important, especially the operating limitations, because it established a baseline for the airworthiness certification of the aircraft.	
26.	Applicant/Operator Capabilities	Review the applicant/operator's capabilities, general condition of working/storage areas, availability of spare parts, and equipment.	
27.	Scope and Qualifications for Restoration, Repairs, and Maintenance	Familiarize yourself with the scope of the restoration, repairs, and maintenance conducted by or for the applicant.	
28.	Limiting Duration of Certificate	Refer to § 21.181 and FAA Order 8130.2, regarding the duration of certificates, which may be limited. An example would be to permit operations for a period of time to allow the implementation of a corrective action or changes in limitations. In addition, an ASI may limit the duration if there is evidence additional operational requirements may be needed at a later date.	
29.	Compliance With § 91.319(a)(1)	Inform the operator that the aircraft are limited under this regulation. The aircraft cannot be operated for any purpose other than the purpose for which the certificate was issued. For example, in the case of an experimental exhibition certificate, the certificate can be used for air show demonstrations, proficiency flights, and flights to and from locations where the maintenance can be performed. Such a certificate is NOT IN EFFECT for flights related to providing military services (that is, air-to-air gunnery, target towing, electronic countermeasures (ECM) simulation, cruise missile simulation, and air refueling). Also refer to <i>Military/Public Aircraft Operations</i> below.	
30.	Multiple Certificates	Ensure the applicant submits information describing how the aircraft configuration is changed from one to the other in those cases involving multiple airworthiness certificates. This is important because, for example, some research and development (R&D) activities may involve equipment that must be removed to revert back to the exhibition configuration (refer to <i>R&D Airworthiness Certification</i> below). Moreover, the procedures should provide for any additional requirement(s), such as additional inspections, to address situations such as high-G maneuvering that could impact the aircraft and/or its operating limitations. Similarly, it should address removing R&D equipment that could be considered part of a weapon system (refer to <i>Demilitarization</i> below). All applications for an R&D certificate must adhere to FAA Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance and/or Research and Development Flight Testing.	

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31.	Public Aircraft Operations, State Aircraft Operations, Military Support Missions, DOD contracts	The special airworthiness certificate and attached operating limitations for this aircraft are not in effect during public aircraft operations (PAO) as defined by Title 49 of the United States Code (49 U.S.C.) §§ 40102 and 40125. They are also not in effect during state aircraft operations (typically military support missions or military contracts), as defined by Article 3 of the International Civil Aviation Organization's (ICAO) Convention on International Civil Aviation. <i>Aircraft used in military services are deemed state aircraft.</i> Also refer to <i>Operations Overseas</i> below.	
32.	Airframe and Engine Data	<p>Ask applicants to provide the following:</p> <p>Airframe:</p> <ul style="list-style-type: none"> • Import country (if applicable), • N-Number, • Manufacture year and serial number, and • Airframe time and airframe cycles. <p>Engine:</p> <ul style="list-style-type: none"> • Type and variant, • Manufacture date and serial number, and • Overhaul data, location, provider, and engine time and cycles. <p>Properly identifying the relevant and basic characteristics of the airframe and the engine are necessary to address the safety issues with the aircraft. The following excerpt from an NTSB report on a former military jet accident illustrates the seriousness of adequate records: "On May 15, 2005, a British Aircraft Corporation 167 Strike Master MK 83, N399WH, registered to DTK Aviation, Inc., collided with a fence during an aborted takeoff from Boca Raton Airport, Boca Raton, Florida. The airplane was substantially damaged and the commercial-rated pilot and passenger sustained minor injuries. The pilot initially stated he performed a preflight inspection of the aircraft which included a flight control continuity check. He had the passenger disable the gust lock for the flight controls. He performed a flight control continuity check before taxiing onto the runway for takeoff; no discrepancies were reported. The takeoff roll commenced and at the calculated rotation speed (70 knots), he '...began to apply pressure to stick and noticed an unusual amount of load on the controls. I made a quick trim adjustment to ensure that the forces on the stick were not the results of aerodynamic loads. When the trim changes yielded no change, I initiated an abort (at approximately Vr at 80 knots) by retarding the throttle, extending the speed brakes, and applying the wheel brakes.' He notified the tower of the situation, briefed the passenger, and raised the flaps. He also opened the canopy after realizing that he was unable to stop on the runway. The airplane traveled off the end of the runway, rolled through a fence and came to rest upright. The pilot also stated that the airplane is kept outside on the ramp at the Boca Raton Airport. Examination of the airplane by an FAA operations inspector before recovery revealed the control column would only move aft between ¼ and ½ inch. No determination was made as to the position of the control lock in the cockpit. Examination of the airplane following recovery by an FAA airworthiness inspector revealed that the elevator was free to travel through the full range but was noted to be '...very stiff.' Additionally, the rudder was '...extremely hard to move in either direction." During movement of the elevator flight control surface, the rudder flight control surface was noted to move, and with movement of the rudder flight control surface, the elevator flight control surface was noted to move. A review of a United Kingdom Civil Aviation Authority (U.K. CAA) Mandatory Permit Directive (MPD) No. 2002-001 R1, issued on January 16, 2003, indicates "partial binding or complete seizure of the elevator/rudder concentric torque tube bearings causing an interconnect between elevator and rudder control systems. This interconnection has resulted in un-commanded rudder movement with the application of elevator control inputs and vice versa. Investigation has determined that bearing seizure was due to inadequate lubrication and water ingress in the elevator torque tube bearings. Aircraft subject to external storage are particularly prone to this occurrence. A review of the airplane maintenance records revealed the airplane was last inspection on June 29, 2004, in accordance with, '...the scope and detail of the inspection program approved by the FSDO for BAC Strikemaster dated June 29, 2001, and found it to be in safe operating condition at this time.' The logbook entry does not indicate airplane total time; therefore, the time since the inspection was not determined. There was no record that U.K. CAA MPD No. 2002-001 R1 had been complied with."</p>	

Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
33.	Re-Conforming to Civil Certificate	Following a public, state, or military aircraft operation, ensure the aircraft is returned, via an approved method, to the condition and configuration at the time of airworthiness certification before operating under the special airworthiness certificate originally issued. This action must be documented in a log or daily flight sheet. Ensure the applicant submits information describing how the aircraft configuration is changed from PAO, state aircraft, or other non-civil classification or activity back to a civil certificate. This is important because, for example, some military support activities may involve equipment or maneuvers that must be removed or mitigated to revert back to original Exhibition or R&D configuration. Moreover, the procedures should provide for any additional requirement(s), such as additional inspections, to address situations such as high-G maneuvering and sustained Gs that could have an impact on the aircraft and/or its operating limitations. Similarly, it should address removing equipment that could be considered part of a weapon system. Refer to <i>Demilitarization</i> below.	
34.	R&D Airworthiness Certification	R&D certification requires a specific project. Ensure the applicant provides detailed information such as— <ul style="list-style-type: none"> • Description of each R&D project providing enough detail to demonstrate it meets the regulatory requirements of § 21.191(a); • Length of each project; • Intended aircraft utilization, including the number of flights and/or flight hours for each project; • Aircraft configuration; • Area of operation for each project; • Coordination with foreign CAA, if applicable; and • Contact information for the person/customer that may be contacted to verify this activity. Note: All applications for an R&D certificate should include review of FAA Order 8130.29.	
35.	Temporary Extensions	This new certification process using an aircraft-specific job aid is being introduced as aircraft are being considered for certification. As a result, the process allows for the field offices to consider temporary extensions of existing airworthiness certificates, as appropriate. This will enable AIR-200 to complete drafting the aircraft-specific job aid and allow the field inspector(s) and the applicant additional time to complete a full review with the job aid. Field inspectors are cautioned when issuing a temporary extension to ensure any safety issues they believe need to be addressed and corrected are mitigated as part of this process. FAA Headquarters (AIR-200, AFS-800, and AFS-300) will assist with any questions concerning issues affecting the aircraft.	
36.	Demilitarization	Verify the aircraft has been adequately demilitarized. This aircraft must remain demilitarized for all civil operations. Refer to the applicable technical guidance.	
37.	Safety Discretion	The field inspector may add any requirements necessary for safety. Under existing regulations and policies, FAA field inspectors have discretion to address any safety issue that may be encountered, whether or not it is included in the job aid. Of course, in all cases, there should be justification for adding requirements. In this respect, the job aid provides a certain level of standardization to achieve this, and in addition, AIR-200 is available to coordinate a review (with AFS-800 and AFS-300) of any proposed limitations an inspector may consider adding or changing. 49 U.S.C. § 44704 states that before issuing an airworthiness certificate, the FAA will find that the aircraft is in condition for safe operation. In issuing the airworthiness certificate, the FAA may include terms required in the interest of safety. This is supported by case law. 14 CFR § 21.193, Experimental Certificates: General, requires information from an applicant, including, “upon inspection of the aircraft, any pertinent information found necessary by the Administrator to safeguard the general public.” 14 CFR § 91.319 <i>Aircraft Having Experimental Certificates: Operating</i> provides “the Administrator may prescribe additional limitations that the Administrator considers necessary, including limitations on the persons that may be carried in the aircraft.” Finally, FAA Order 8130.2, chapter 4, Special Airworthiness Certification, effective April 16, 2011, also states the FAA may impose any additional limitations deemed necessary in the interest of safety.	

Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
38.	2009 Crash of ZU-BEX	Recommend the accident report concerning the 2009 Lightning T5 ZU-BEX be reviewed in detail. This report, published by the South African CAA in August 2012, provides valuable insight into the consequences of operating complex and high-performance former military aircraft in an unsafe manner. The relevant issues identified in the report include (1) ignoring operational history and accident data, (2) inadequate maintenance practices, (3) granting extensions on inspections, (4) poor operational procedures, and (5) inadequate safety oversight. Many of the issues discussed and documented in the accident investigation report are directly relevant to safety topics discussed in this airworthiness review document. The South African CAA report can be found at http://www.caa.co.za/ .	
39.	Importation	Review any related documents from U.S. Customs and Border Protection and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) for the aircraft. If the aircraft was not imported as an aircraft, or if the aircraft configuration is not as stated in Form ATF-6, it may not be eligible for an airworthiness certificate. There are many cases in which Federal authorities have questioned the origin of former military aircraft and its installed weapon system. Some have been seized. For example, two T-28s were seized at the Canadian border by U.S. Customs officials in 1989. Refer to Federal Firearms Regulations Reference Guide, ATF Publication 5300.4, Revised September 2005, for additional guidance.	
40.	Brokering	Verify the application for airworthiness does not constitute brokering. Section 21.191(d) was not intended to allow for the brokering or marketing of experimental aircraft. This includes individuals who manufacture, import, or assemble aircraft, and then apply for and receive experimental exhibition airworthiness certificates so they can sell the aircraft to buyers. Section 21.191(d) only provides for the exhibition of an aircraft's flight capabilities, performance, or unusual characteristics at air shows, and for motion picture, television, and similar productions. Certifying offices must verify all applications for exhibition airworthiness certificates are for the purposes specified under § 21.191(d) and are from the registered owners who will exhibit the aircraft for those purposes. Applicants must also provide the applicable information specified in § 21.193.	
41.	Federally Obligated Airport Access	Inform the operator that operations may be restricted by airports because of safety considerations. As provided by 49 U.S.C. § 47107(a), a federally obligated airport may prohibit or limit any given type, kind, or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public. Additionally, per FAA Order 5190.6, FAA Airport Compliance Manual, the airport should adopt and enforce adequate rules, regulations, or ordinances as necessary to ensure safety and efficiency of flight operations and to protect the public using the airport. In fact, the prime requirement for local regulations is to control the use of the airport in a manner that will eliminate hazards to aircraft and to people on the ground. In all cases concerning airport access or denial of access, and based on FAA Flight Standards Service safety determination, FAA Airports is the final arbiter regarding aviation safety and will make the determination (Director's Determination, Final Agency Decision) regarding the reasonableness of the actions that restrict, limit, or deny access to the airport (refer to FAA Docket 16-02/08, FAA v. City of Santa Monica, Final Agency Decision; FAA Order 2009-1, July 8, 2009; and FAA Docket 16-06-09, Platinum Aviation and Platinum Jet Center BMI v. Bloomington-Normal Airport Authority).	
42.	Environmental Impact (Noise)	Inform the operator that operations may be restricted by airport noise access restrictions and noise abatement procedures in accordance with 49 U.S.C. § 47107. As a reference, refer to FAA Order 5190.6.	

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43.	Restrictions on Operations Overseas	<p>Inform the applicant/operator that operations may be restricted and permission must be granted by a foreign CAA. The applicable CAA may impose any additional limitations it deems necessary, and may expand upon the restrictions imposed by the FAA on the aircraft. In line with existing protocols, the FAA will provide the foreign CAA any information, including safety information, for consideration in evaluating whether to permit the operation of the aircraft in their country, and if so, under what conditions and/or restrictions. It is also noted any operator offering to use a U.S. civil aircraft with an experimental certificate to conduct operations such as air-to-air combat simulations, ECM, target towing for aerial gunnery, and/or dropping simulated ordinances pursuant to a contract or other agreement with a foreign government or other foreign entity would not be doing so in accordance with any authority granted by the FAA as the State of Registry or State of the Operator. On the issue of operations overseas:</p> <ul style="list-style-type: none"> ➤ Under international law, the aircraft will either be operated as a civil aircraft or a state aircraft. The aircraft cannot have a combined status. If the aircraft are to be operated with civil status, then they must have FAA-issued airworthiness certificates. If the applicant/operator is seeking experimental certificates for R&D or Exhibition purposes for the aircraft, and if the FAA issues (or renews) those certificates for the aircraft, then the only permissible operation of the aircraft as civil aircraft in a foreign country, is for an R&D or Exhibition purpose. The applicant/operator cannot be allowed to accomplish other purposes during the same operation, such as performing the contract for a foreign air force. This position is necessary to avoid telling an operator that any R&D or Exhibition activity could serve as a cover for a whole host of improper activities using an aircraft with an experimental certificate for R&D or Exhibition purposes, rendering the R&D or Exhibition limitation on the certificate meaningless. ➤ The R&D or Exhibition activity would be a pretext for the real purpose of the operation. Accordingly, in issuing experimental certificates for an R&D or Exhibition purpose, the FAA must make it clear that any other activities or purposes for the operation are outside the scope of permitted operations under the certificate. The FAA must also make clear that the operation as a civil aircraft requires the permission of the foreign civil aviation authority (CAA). In requesting that permission, the applicant/operator should advise the foreign aviation authority that the operation will be for an R&D or Exhibition purpose only and for no other purpose, including performing a contract for any foreign military organization. ➤ The applicant/operator must understand that if the foreign CAA asks FAA about the operation, the FAA will state "that the only permissible purpose of the operation is R&D or Exhibition, and an operation for any other purpose, even when conducted in conjunction with an R&D or Exhibition purpose, is outside the scope of the operations allowed under the certificate. ➤ If the applicant/operator operates the aircraft as state aircraft, then the national government of some country will have designated the aircraft as its state aircraft, and the host country, will have given the aircraft permission to operate through the issuance of a diplomatic clearance. That diplomatic clearance should include whatever terms and conditions that CAA deems necessary or appropriate for the operation. ➤ The aircraft, when operated as state aircraft, does not need an FAA airworthiness certificate, and the pilots of those aircraft do not need to hold FAA-issued airman licenses. <p>If a country issues a diplomatic clearance for the operation of the aircraft, the aircraft would be deemed to be a state aircraft of the country requesting that clearance. Safety oversight would rest with the country that requested the diplomatic clearance.</p>	

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44.	Initial Contact Checklist	<p>The following is a sample of the contents of an initial contact by an FAA field office to an applicant concerning a proposed certification. It addresses many of the major safety and risk issues with the aircraft and will assist in (1) preparing an airworthiness applicant, (2) making corrections and updating any previous application, and (3) documenting the level of airworthiness review.</p> <ol style="list-style-type: none"> 1. Discuss item missing from the application. <ol style="list-style-type: none"> a. Program letter setting the purpose for which the aircraft will be used. <ol style="list-style-type: none"> i. Exhibition of aircraft flight capabilities, performance, unusual characteristics at air shows, motion picture, television and similar productions, and maintenance of exhibition flight proficiency, including flying to and from such air shows and productions. ii. Aircraft cannot be certified if the intention is to broker or sell the aircraft. iii. Aircraft photos. 2. Prepare aircraft and documentation for FAA inspection. <ol style="list-style-type: none"> a. Maintenance and modification records. b. Aircraft history and logbooks (airframe, engine, and components). c. Have the aircraft maintenance program ready for review and acceptance. d. Have operations and maintenance and supplements. e. Have crew qualifications ready for review (pilot, mechanics, A&P, IA). f. Be prepared to show spare parts records. g. Be prepared to accomplish preflight, ground checks, run-up, and taxi checks. h. Be prepared to demonstrate the aircraft has been demilitarized. i. Have records on status of ejection seats. j. Be prepared to discuss required ground support equipment and specialized tooling for maintenance. k. Be prepared to discuss and document the airframe fatigue life program compliance. l. Be prepared to discuss engine thrust measurement process. m. Be prepared to demonstrate oxygen system checks. n. If "G" suits are used be prepared to demonstrate serviceability. o. Have records for any fabricated parts and engineering documentation if required. p. Have records on flight control balancing. q. Have weight and balance records. r. Be prepared to discuss external stores. s. Be prepared to discuss Phase I test flights (recommended a minimum of 10 hours). t. Have record of installed avionics. 3. Applicable regulations and ACs. <ol style="list-style-type: none"> a. §§ 21.93, 21.181, 21.193, 21.191(d), 23.1441, 43.3, 43.9, 45.11, 45.23(b), 45.25, 45.29, 91.205, 91.307, 91.319(a)(1), 91.407, 91.409(f)(4), 91.411, 91.413, 91.417, 91.1037, 91.1109, and AC 43-9, AC 91-79. 4. Items to discuss with applicant. <ol style="list-style-type: none"> a. Recommendation of establishing a minimum equipment list. b. Recommend establishing minimum pilot experience and proficiency, including (1) FAA PIC policy, NAVAIR training, (2) 10 to 15 hours of dual time, and (3) 3 hours per month, and five takeoffs and landings. c. Recommend establishing minimum runways length criteria for takeoff and landing. d. Discuss military use, that is, declaration of public use operations (PAO) and operating limitations. 	

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F-86 Maintenance Manual(s), Aircraft Inspection Program (AIP), and Servicing			
45.	Changes to Aircraft Inspection Program (AIP)	<p>Consider whether the FAA-accepted AIP is subject to revisions to address safety concerns, alterations, or modifications to the aircraft. Section 91.415, Changes to Aircraft Inspection Programs, requires that “whenever the Administrator finds that revisions to an approved aircraft inspection program under § 91.409(f)(4) or § 91.1109 are necessary for the continued adequacy of the program, the owner or operator must, after notification by the Administrator, make any changes in the program found to be necessary by the Administrator.” As provided by § 91.415, review the submitted maintenance manual(s) and AIP. Work with the applicant to revise the AIP as needed based on any concerns identified in attachment 3 to this document. For example, an AIP can be modified to address or verify—</p> <ul style="list-style-type: none"> • Consistency with the applicable military TOs for airframe, powerplant, and systems to verify replacement/interval times are addressed. • All AIP section and subsections include the proper guidance/standards (that is, TOs or Engineering Orders) for all systems, groups, and tasks. • No “on condition” inspections for items that have replacement times unless proper technical data to substantiate the change, that is, aileron boost and oxygen regulator. • Ejection seat system replacement times are adhered to. No “on condition” inspections for rocket motors and propellants. Make the distinction between replacement times, that is, “shelf life” vs. “installed life limit.” • Any deferred log is related to a listing of minimum equipment for flight (refer to <i>Minimum Equipment for Flight</i> below, and AFI 21-103); • Inclusion of document revision page(s). 	
46.	AIP Is Not a Checklist	<p>Ensure the AIP stresses it is not a checklist. This is important in many cases because the actual AIP is only a simple checklist and actual tasks/logbook entries say little of what was actually accomplished and to what standard. This is one of the major issues with some FAA-approved inspection programs, and stems from confusion about the different nature of (1) aircraft maintenance manuals, (2) AIPs, and (3) inspection checklists. Unless a task or item points to technical data (not just a reference to a manual), it is simply a checklist, not a manual. Ensure the AIP directs the reader to other references such as technical data, including references to sections and pages within a document (and revision level), that is, “AC 43-13, p.318” or “inspection card 26.2.” Records must be presented to verify times on airframe and engines, inspections, overhauls, repairs, and in particular, time in service, time remaining and shelf life on life limited parts. It is the owner’s responsibility to ensure these records are accurate. Refer to Classic Jet Aircraft Association (CJAA) Safety Operations Manual, Rev. 6/30/08.</p>	
47.	AIP Limitations	<p>Refrain from assuming compliance with the applicable military standards, procedures, and inspections is sufficient to achieve an acceptable level of safety for civil operations, as part of the airworthiness certification and related review of the AIP. This may not be true, depending on the situation and the aircraft. For example, an AIP based on 1978 USAF or NAVAIR requirements does not necessarily address the additional concerns or issues 35 years later, such as aging, structural and materials deterioration, stress damage (operations past life limits), extensive uncontrolled storage, new techniques, and industry standards.</p>	
48.	AIP Revision Records	<p>Ensure the applicant/operator retains a master list of all revisions that can be reviewed in accordance with other dated material that may be required to be done under a given revision. The AIP should address revision history for manual updates and flight log history.</p>	
49.	Maintenance Responsibilities	<p>The AIP should address responsibilities and functions in a clear manner. The AIP should address the difference between the aircraft owner and operator. The AIP also needs to address any leasing arrangement where maintenance is spilt or otherwise outside of the control of the applicant, that is, where maintenance is contracted to another party. The AIP should define the person responsible for maintenance. The AIP should address qualifications and delegations of authority, that is, whether the person responsible for maintenance has inspection authority and airworthiness release authority, or authority to return for service. In terms of inspection control and implementation, the AIP should define whether it is a delegation of authority, and if so, what authority is being delegated by the owner and operator. This has been an issue with the NTSB (and the Civil Aeronautics Board before it) since 1957.</p>	

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50.	Return to Service	Ensure the AIP clearly defines who can return the aircraft to service and provides minimum criteria for this authority. Follow the intent and scope of § 43.5, Approval for return to service after maintenance, preventive maintenance, rebuilding, or alteration; and § 43.7, Persons authorized to approve aircraft, airframes, aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, rebuilding, or alteration.	
51.	Maintenance Practices	Consider AC 43.13-2, Acceptable Methods, Techniques, and Practices-Aircraft Alterations, and AC 43.13-1, Acceptable Methods, Techniques, and Practices-Aircraft Inspection and Repair, in addition to any guidance provided by the manufacturer/military service(s), to verify safe maintenance practices.	
52.	Qualifications for Inspections	Ensure only FAA-certificated repair stations and FAA-certificated mechanics with appropriate ratings as authorized by § 43.3 perform inspections on the aircraft.	
53.	Modifications	Verify major changes conform to the applicable guidance (i.e., USAF, RCAF, NATO) and do not create an unsafe condition, and determine whether new operating limitations may be required within the scope and intent of § 21.93. In addition, the information contained in appendix A to part 43 can be used as an aid. Refer to <i>Potential Reversion Back to Phase I</i> above.	
54.	F-86 Maintenance Schedule and Program Airframe (Includes Engine and Component Replacement Intervals)	Ensure the AIP follows the applicable requirements, as appropriate (i.e., USAF, RCAF, NATO), concerning inspections and required components replacement. For example, under USAF standards, the proper reference is the most current version of USAF TO 1F-86-6, <i>Inspection Requirements</i> . Older classifications, such as <i>Handbook Maintenance Instructions, USAF Series F-86E Aircraft – T.O. 1F-86E-2, Revised 20 December 1952</i> , T.O. 1F-86E-2 (Formerly AN 01-60JLB-2) may be available as well. This is important when developing an inspection program under § 91.409. The inspection program must comply with both hourly and calendar inspection schedules. The only modifications to the military AIP should be related to the removal of military equipment and weapons. Deletions should be properly documented and justified. A 100-hour, 12-month inspection program under appendix D to part 43 may not be adequate. Review the AIP for compliance with the applicable USAF/Canadian Armed Forces/Royal Air Force guidance such as the TO 1F86-6, <i>Inspection Requirements</i> . This is important when developing an inspection program under 14 CFR § 91.409. The inspection program must comply with both hourly and calendar inspection schedules. The only modifications to the military AIP should be related to the removal of military equipment and weapons. Deletions should be properly documented and justified with technical data. If aircraft is a Canadian aircraft, then RCAF guidance applies instead of the USAF guidance.	
55.	Organizational Manuals	The AIP must incorporate the guidance in the applicable manuals for the aircraft, airframe, engine, accessories and appliances. For example, the handbooks required for the F-86E airframe, J47-GE-13 engine, and associated accessory equipment is the AN 01-60JLB-2. Supplementary information on operation, repair, inspection, and parts listing may be found in the following publications: <ul style="list-style-type: none"> • T.O. 1F-86-6 <i>Inspection Requirements</i>; • T.O. 1F-86E-2 <i>Handbook Maintenance Instructions</i>; • T.O. 1F86-3 <i>Handbook Structural Repair Instructions</i>; • T.O. 1F-86A-1 <i>Flight Handbook</i>; • AN 01-60JLB-1 <i>Flight Handbook</i>; • AN 01-60JL-3 <i>Handbook of Structural Repair</i>; • AN 01-60JLB-4 <i>Parts Catalog</i>; • AN 01-60JLB-6 <i>Handbook of Inspection Requirements</i>; 	
56.	F-86 Quality Work Instruction Manual	The use of an F-86 <i>Sabre Jet Quality Work Instruction Manual</i> covering inspection, testing, and aircraft departure checks, is recommended. Note: Some operators develop their own quality, FOD, and aircraft maintenance processes.	

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57.	Airframe, Engine, and Component Replacement Intervals	Verify compliance with required replacement intervals as outlined in appropriate and most current military inspection guidance. If components are not replaced per the military guidance, ask for data to justify extensions. Applicants should establish and record time-in-service for all life-limited components and verify compliance with approved life limits. Set time limits for overrun of intervals and track cycles. Evaluate any overruns of inspection or maintenance intervals.	
58.	Missing Inspection Tasks	Verify the AIP follows the applicable requirements (i.e., USAF, NAVAIR, NATO) in terms of inspection tasks. It is imperative that no inspection tasks required by the military standard are removed. If they are removed, there should be adequate justification, and it cannot be solely cost-related. There have been several cases where an AIP did not conform to the applicable military standard and tasks were removed without adequate justification.	
59.	Drag Chute	If a drag chute is installed, verify it is done per the applicable guidance and the AIP reflects that installation. There should be adequate technical data to validate the installation.	
60.	Appendix G to 14 CFR Part 23	Recommend appendix G to part 23 be used as a tool (not a requirement) because it can assist in the review of the applicant's proposed AIP and associated procedures and sets a good baseline for any review. NAVAIR guidance should also contain instructions for the continued airworthiness of the aircraft. Appendix G to part 23 covers instructions for continued airworthiness.	
61.	Prioritize Maintenance Actions	Recommend the adoption of a risk management system that reprioritizes high-risk maintenance actions in terms of (a) immediate action, (b) urgent action, and (c) routine action. Also refer to <i>Recordkeeping, Tracking Discrepancies, and Corrective Action</i> , below.	
62.	Cannibalization	Cannibalization is a common practice for several former military aircraft operators and service providers. The extent to which it takes place is not necessarily an issue, but keeping adequate records of the transfers, uses, and condition is. In 2001, the U.S. Government Accountability Office (GAO) published its findings on cannibalization of aircraft by the U.S. Department of Defense (DOD). It found cannibalizations have several adverse impacts. They increase maintenance costs by increasing workloads and create unnecessary mechanical problems for maintenance personnel. The GAO also found that with the exception of the Navy, the services do not consistently track the specific reasons for cannibalizations. In addition, a U.S. Navy study found cannibalizations are sometimes done because mechanics are not trained well enough to diagnose problems or because testing equipment is either not available or not working. Because some view cannibalization as a symptom of spare parts shortages, it is not closely analyzed, in that other possible causes or concerted efforts to measure the full extent of the practice are not made.	
63.	Recordkeeping, Tracking Discrepancies, and Corrective Action	Check applicant recordkeeping. The scope and content of §§ 43.9, 43.11, and 91.417 are acceptable. Recommend the use the USAF Form 781 process (or NAVAIR MAF, or RAF Form 700) to help verify an acceptable level of continued operational safety (COS) for the aircraft. Three types of maintenance discrepancies can be found inside USAF Form 781: (1) an informational, that is, a general remark about a problem that does not require mitigation; (2) a red slash for a potentially serious problem; and (3) a red "X" highlighting a safety of flight issue that could result in an unsuccessful flight and/or loss of aircraft—no one should fly the aircraft until the issue is fixed. For more information on recordkeeping, refer to AC 43-9, Maintenance Records.	
64.	Qualifications of Maintenance Personnel	Check for appropriate qualifications, licensing, and type-specific training of personnel engaged in managing, supervising, and performing aircraft maintenance functions and tasks. The NTSB has found the use of non-certificated mechanics with this type of aircraft has been a contributing factor to accidents. Only FAA-certificated repair stations and FAA-certificated mechanics with appropriate ratings as authorized by § 43.3 perform maintenance on this aircraft.	
65.	Ground Support, Servicing, and Maintenance Personnel Recurrent Training	Recommend regular refresher training be provided to ground support, servicing, and maintenance personnel concerning the main safety issues surrounding servicing and flight line maintenance of the aircraft. Such a process should include a recurrent and regular review of the warnings, cautions, and notes listed in the appropriate technical manuals. Note: Ejection seat safety is paramount.	
66.	Parts Storage and Management and Traceability	Recommend establishing a parts storage program that includes traceability of parts. This is important in many cases because there is no original equipment manufacturer (OEM) support.	

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67.	Maintenance Records and Use of Tech Data	Conduct a detailed inspection of maintenance records, as required by FAA Order 8130.2. Verify maintenance records reflect inspections, overhauls, repairs, time-in-service on articles, and engines. Ensure all records are current and appropriate technical data is referenced. This should not be a cursory review. Maintenance records are commonly inadequate or incomplete for imported aircraft.	
68.	Airframe Limitations and Durability	Verify whether the AIP addresses the aircraft's airframe limit, how total time is kept, and the status of any extension. Verify the appropriate data is available to consider an extension past the life limit for the airframe and wings.	
69.	"On Condition" Inspections	Adhere to the military/manufacture program and/or provide adequate data to justify that practice for the applicable part or component if "on condition" inspections are considered. "On condition" must reference an applicable standard (that is, inspect the fuel pump to an acceptable reference standard, not just "it has been working so far"). Each "on condition" inspection must state acceptable parameters. "On condition" inspections are not appropriate for all parts and components.	
70.	On Condition Inspection – Material Deterioration of Minor Items	The AIP must provide for the inspection of minor items such as gear door locks, boost pumps, and electrical relay canvas covers for material deterioration and replace as necessary. The USAF said in their aircraft accident summary in 1965 that the F-86 has an urgent need for increased care as these aircraft grow older. It stated that these faulty components resulted into destroyed aircraft and could have been prevented by conscientious and alert maintenance personnel. From 1961 – 1965, there have been 34 major accidents directly attributed to "Materials" as the primary factor.	
71.	Aging	Verify the AIP addresses the age of the aircraft. This means many, if not all, of the age effects have an impact on the aircraft, including: (1) dynamic component wear out, (2) structural degradation/corrosion, (3) propulsion system aging, (4) outdated electronics, and (5) expired wiring.	
72.	Use of Cycles (General)	<p>Recommend the AIP provides for tracking cycles, such as airframe and engine cycles, in addition to time and in combination with inspections. This allows for the buildup of safety margins and reliability. In military jet aircraft, there is a relationship between parts failures, especially as they relate to power plants, landing gears, and other systems, and for that reason it is very important to track airframe and engine cycles between failures and total cycles to enhance safety margins. For example, tracking all aircraft takeoffs for full-thrust and de-rated thrust takeoffs as part of the inspection and maintenance program would be a good practice and can assist in building up reliability data. The occurrence of failures can be meaningfully reduced, and cycles can play an important role. When rates are used in the analysis, graphic charts (or equivalent displays) can show areas in need of corrective action. Conversely, statistical analysis of inspection findings or other abnormalities related to aircraft/engine check and inspection periods requires judgmental analysis. Therefore, programs encompassing aircraft/engine check or inspection intervals might consider numerical indicators, but sampling inspection and discrepancy analysis would be of more benefit. A data collection system should include a specific flow of information, identity of data sources, and procedures for transmission of data, including use of forms and computer runs. Responsibilities within the operator's organization should be established for each step of data development and processing. Typical sources of performance information are as follows, however, it is not implied that all of these sources need be included in the program nor does this listing prohibit the use of other sources of information:</p> <ul style="list-style-type: none"> • Pilot reports, In-flight engine performance data, Mechanical interruptions/delays, • Engine shutdowns, Unscheduled removals, Confirmed failures, Functional checks, Bench checks, • Shop findings, Sampling inspections, Inspection discrepancies, and Service difficulty reports. 	
73.	Inspect and Repair as Necessary (IRAN)	If an IRAN is utilized, verify it is detailed and uses adequate technical data (that is, include references to acceptable technical data) and adequate sequence for its completion if it is proposed. An IRAN must have a basis and acceptable standards. It is not analogous to an "on condition" inspection. It must have an established level of reliability and life extension. An IRAN is not a homemade inspection program.	
74.	Combining Inspection Intervals into One	Set time limits for overrun (flex) of inspection intervals in accordance with the applicable guidance (i.e., USAF, RCAF, NATO).	

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75.	Aircraft Storage and Returning the Aircraft to Service After Inactivity	Verify the applicant has a program to address aircraft inactivity and specifies specific maintenance actions for return to service per the applicable inspection schedule(s) (for example, after 31 days). The aircraft should be housed in a hangar during maintenance. When the aircraft is parked in the open, it must be protected from the elements, that is, full blanking kit and periodic anti-deterioration checks are to be carried out as weather dictates.	
76.	Specialized Tooling for Maintenance	Verify adequate tooling, jigs, and instrumentation are used for the required periodic inspections and maintenance per the maintenance manuals.	
77.	Technical Orders Issued While in Service (Engineering Orders in RCAF Service)	Verify the AIP references and addresses the applicable USAF TOs or RCAF Engineering Orders issued to the F-86 during military service to address airworthiness and safety issues, maintenance, modifications, updates to service instructions, and operations of the aircraft. Also see <i>F-86 Restricted Executive Orders</i> and <i>Time Critical Technical Orders (TCTO)</i> below.	
78.	F-86 Restricted Executive Orders	Verify the AIP references and addresses the applicable RCAF F-86 restricted Executive Orders.	
79.	Time Critical Technical Orders (TCTO)	Verify the AIP specifically accounts for, addresses, and documents the applicable TCTOs (or Canadian Armed Forces equivalent) issued to the F-86 while in service. Compliance with the TCTOs is essential for safe operations. If the AIP only makes reference to a few TCTOs issued, for example, it would not be adequate.	
80.	Safety Supplements	Verify the applicant/operator has copies of the applicable safety supplements for the aircraft and they are incorporated into the AIP or operational guidance as appropriate.	
81.	Corrosion Due to Age and Inadequate Storage	Ask whether a corrosion control program is in place. This is a must for the F-86. If not, ask for steps taken or how it is addressed in the AIP. Evaluate adequacy of corrosion control procedures. Age, condition, and types of materials used in many former military aircraft require some form of corrosion inspection control. Recommend the use of TO 1-1-691, Corrosion Prevention and Control Manual.	
82.	Pylons (Structural)	If applicable and installed, verify the AIP addresses the inspection of the aircraft's centerline pylons per the applicable guidance (i.e., USAF, RCAF, NATO) from a structural standpoint, including checking them for cracks.	
83.	Engine Maintenance Procedures	Verify the AIP adheres to the maintenance procedures requirements per the applicable engine guidance.	
84.	Manufacturer's and/or USAF Engine Modifications	Verify the AIP addresses the incorporation of the manufacturer and military (USAF/RCAF) modifications to the J47/Orenda engine installed. The NTSB and some foreign CAAs have determined a causal factor in some accidents is the failure of some civil operators of former military aircraft to incorporate the manufacturer's recommended modifications to prevent engine failures.	
85.	Cycles and Adjustment Engine Replacement Intervals	Ask if both engine cycles and hours are tracked. If not, recommend it be done.	
86.	Failures and Failure Modes	Verify the AIP discusses the known engine failure and failure modes.	
87.	Engine Components Life Limits	Verify the AIP addresses the life limit of engine components. "On condition" inspections are not acceptable.	

Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
88.	Engine Inspections and Time Between Overhaul (TBO)	Verify the applicant has established the proper inspection intervals and TBO/replacement interval for the specific engine type (J47/J93/Orenda) and adhere to those limitations and replacement intervals for related components. The TBO ranges from 15 to 625 hours. Clear data on TBO/time remaining on the engine at time of certification is critical as is documenting those throughout the aircraft life cycle. Justification and FAA concurrence is required for an inspection and TBO above those set in the appropriate aircraft/engine inspection guidance.	
89.	Engine Check	Verify the AIP includes adequate procedures (i.e., USAF, RCAF, NATO), including checks and signoffs for returning an aircraft to airworthiness condition after any work on the engine. As an example, as part of its investigation of a fatal former military aircraft accident in 2004, the NTSB found after an engine swap-out the week before the fatal accident, the mechanics had warned the newly installed engine was not operating correctly. The record also shows the A&P mechanic who oversaw and supervised the engine change did not sign off any maintenance records to return the airplane to an airworthy status. Before the fatal flight, two engine acceleration tests failed, and multiple aborted takeoffs took place in the days leading up to the crash.	
90.	Engine Thrust	Verify the AIP includes measuring actual thrust of the engine and tracking engine operating temperatures.	
91.	Afterburners and Nozzle	If applicable, verify the AIP specifically addresses the inspection of the afterburner system and the augmentor nozzle and related actuators.	
92.	Use of Different Fuels	Verify the AIP addresses how the use of different fuels may require changes or additions to the engine inspection and maintenance programs.	
93.	Engine Ground Run	Verify the engine goes through a ground run and check for leaks after reassembly. Confirm it achieves the required revolutions per minute for a given exhaust gas temperature (EGT), outside air temperature, and field elevation.	
94.	Fire Detection and Suppression System	If equipped, verify the serviceability of the fire detection and suppression system. The operator should establish an inspection process (reference the appropriate technical guidance) to ensure the validity of the fire warning system.	
95.	Servicing, Engine Fire Servicing Personnel Unfamiliar with the Aircraft Create Hazardous Situations	Ensure the operator warns servicing personnel via training and markings of the fire hazard of overfilling oil, hydraulic, and fuel tanks. Lack of experience with the aircraft servicing is a safety concern. Require supervision of servicing operations and fire safety procedures.	
96.	Fire Guard	Verify maintenance, servicing, preflight, and post-flight activities include fire guard precautions. This is a standard USAF/NAVAIR safety-related procedure.	
97.	Oil Tank	Inspect oil tank area for damage and corrosion. This has been linked to engine fires.	
98.	Engine Start	Verify the AIP includes procedures for documenting all unsuccessful starts.	
99.	Turbine Flame Inspection	Recommend that the AIP incorporates a method to conduct a turbine flame inspection.	
100.	Afterburner Failures(F-86D/L/K)	Ensure afterburner inspections (and related systems) are completed before and after each flight and that repairs are made as necessary. Do not allow use of afterburner unless modified by T.O. 2J-J47-293 and have a ceramic coated tail pipe installed.	
101.	Tail/Engine Separation	Ensure adequate tail/engine separation by using proper support equipment to prevent structural and serious engine damage.	
102.	Engine Storage	Review engine storage methods and determine engine condition after storage. Evaluate calendar time since the last overhaul. For example, the use of an engine with 50 hours since a 1991 overhaul may not be adequate and a new overhaul may be required after a specified time in storage. Engines that have exceeded storage life limits are susceptible to internal corrosion, deterioration of seals and coatings, and breakdown of engine preservation lubricants.	

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103.	Borescope Engine	Recommend the AIP incorporate borescope inspections of the engine at 50 hours per the applicable inspection procedures. AC 43.13-1 can be used as a reference.	
104.	Wiring Diagram and Inspection	Verify the AIP includes up-to-date wiring diagrams consistent with the appropriate guidance (i.e., USAF, RCAF, NATO) and includes the appropriate inspection procedures. Any reference to the applicable guidance must address modifications. In addition to the appropriate guidance, another reference is NA 01-1AA-505, Joint Service General Wiring Maintenance Manual.	
105.	Engine Foreign Object Damage (FOD)	Verify adoption of an FOD prevention program (internal engine section, external, and air intake). Use and properly inspect the air intake screen (FOD guards) provided with the aircraft and designed for the aircraft. The J47 is highly susceptible to FOD.	
106.	Engine Condition Monitoring (Oil Analysis)	As part of the engine maintenance schedule, recommend an engine Spectrographic Oil Analysis Program (SOAP) be implemented with intervals of less than 5 hours. If baseline data exists, this can be very useful for failure prevention. If manufacturer baseline data does not exist, this may still warn of impending failure. For the latest guidance on SOAPS, refer to Joint Oil Analysis Program Manual, Volume III: Laboratory Analytical Methodology and Equipment Criteria. (Aeronautical). (Navy) NAVAIR 17-15-50.3, (Army) TM 38-301-3, (Air Force) TO 33-1-37-3, and (Coast Guard) CGTO 33-1-37-3, dated July 31, 2012. This document presents the methodology for evaluating spectrometric analyses of samples from aeronautical equipment. The methodology enables an evaluator to identify wear metals present in the sample and their probable sources, judge equipment condition, and make recommendations that influence maintenance and operational decisions. Following these recommendations can enhance safety and equipment reliability and contribute to more effective and economic maintenance practices.	
107.	Engine Bleed Air	Verify the AIP includes procedures for inspecting and ensuring the serviceability of the engine bleed air system.	
108.	Fuel Control Switch	Inspect proper fitting of fuel control switch. Ben Hall's account of restoring an F-86, N68388, encountered 6 months of abortive attempts to start and run-up the engine, due to the incorrect fitting of the fuel control switch on the engine illustrates this. See Allward, Maurice. <i>F-86 Sabre</i> . Charles Scribner's Sons, New York, 1978.	
109.	Fuel Flow Control Valve	Adhere to manufacturer's inspection guidelines and replacement times. Rupture of the rubber membrane in engine fuel flow control valve results in fuel in the engine oil, requiring engine removal.	
110.	Main Fuel Pump Inspection	The AIP needs to provide not only for the inspection of the main fuel pump on the F-86 aircraft as per the applicable USAF/RCAF guidance, but also to verify its functionality before each flight. A 1954 report stated that 32 of 144 F-86F accidents (22 percent) were determined to be or suspected to be related to the fuel control system. In particular, the F-86F's engine, J47-GE-27, was "very susceptible to compressor stall." The report blamed pilots for not following proscribed procedures. As part of the investigation into a fatal 1999 accident, the NTSB noted: "According to a pilot who flew the accident airplane on the airshow circuit, in April of 1999, he experienced a flame-out at altitude do to fuel starvation. He executed a successful air-start, and landed the airplane without incident. At first, it was thought the fuel control may have caused the loss of power, but the idea was dismissed after conducting extensive reach, and not finding any documented failures of the type of fuel control unit being used. Ultimately, the right electric boost pump, and the left electric boost pump were identified as inoperative and changed. In addition, both engine driven fuel pumps were replaced. After the incident, a procedure was developed to test the operation of the boost pumps, and the engine drive pumps to insure proper operation prior to each flight....According to an F-86 mechanic, a pilot would have no indication that the aft fuselage pump or fuel level transmitter had failed... A warning in the Aircraft Operating Instructions stated that, "A possibility of fuel starvation and subsequent engine flameout will exist when failure of the aft fuselage pump or fuel level transmitter occurs with the aircraft in a climbing attitude at low fuel state i.e., below 500 lbs." In addition, "A considerable amount of fuel can be trapped in the aft fuselage cell under these conditions. Where flight is necessary with low fuel state pilot should avoid nose high attitudes."	
111.	Safety-Lock Fuel Pipe to Main Fuel Pump	Inspect for and check the safety lock mechanism from the main fuel pump to the connecting fuel pipe. For example: In June 1955, a RAF plane exploded and crashed when the fuel pipe became disconnected to the main fuel pump as determined from the crash investigation. It was recommended from this accident that to safety-lock these two fuel connections in all future Sabre aircraft.	

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112.	Emergency Fuel Regulator	Depending on model of F-86, the emergency fuel regulator could prove to be problematic and must be inspected. If it was left on it could, along with rapid throttle movement, call for too much fuel and cause an engine flameout. Early models of F-86s suffered numerous engine flame-outs with older of 2 types of emergency fuel regulators. The USAF replaced early models of the emergency fuel regulator, yet it did not completely solve the problem. Col. Clay Tice stated that "Pilots forgetting to turn the stand-by switch off after take-off proved to be so destructive...that this Group was forced to abolish its use for take-off." He went on to state that "The emergency fuel regulator has been responsible for the destruction of far more aircraft at this base than it saved. It is inconceivable that it has not been resigned." The system is still retained without the stand-by feature, consisting only of "on", "off," and "test" positions.	
113.	Fuel Tank Inspections and Related Structures	Verify the AIP includes procedures for inspecting the fuel tanks (and related structures). Deterioration of bladder tank (bag) and the sealant can pose a safety problem, especially because of the aircraft's age and storage, as well as the difficulty of the inspection (and access to the fuel tanks) itself. Bladder-type fuel tank safety is not necessarily ensured by only "on-condition" inspections and may require more extensive processes, including replacements. In any event, adequate data must be provided for any justification to inspect rather than replacing the fuel tanks at the end of their life limit. See <i>Fuselage Fuel Tanks</i> below.	
114.	Fuselage Fuel Tanks	Inspect all fuselage fuel tanks for cracks as per the applicable technical guidance. For example, an RAF squadron in 1955 were grounded when cracks to the fuselage fuel tanks were discovered.	
115.	Broken Systems (Fuel, Oil, and Hydraulic) Lines	Verify the AIP includes procedures for inspecting and replacing fuel, oil, and hydraulic lines according to the applicable USAF/RCAF requirements; for example, MIL-DTL-8794 and MIL-DTL-8795 specifications. Such failures are common in older F-86s.	
116.	Systems Functionality and Leak Checks	Verify procedures are in place to check all major systems in the aircraft for serviceability and functionality. Verify the leak checks of all systems are properly accounted for in the AIP per the USAF requirements.	
117.	Hydraulic System Problems	Adhere to USAF/RCAF inspection guidelines and replacement times. The "A" model is the only variant that can revert to manual flying control.	
118.	Defroster System	Verify procedures are in place to service the defroster system per the inspection and maintenance manual.	
119.	Oil, Fuel, and Hydraulic Fluids	Verify procedures are in place to identify and use a list of equivalents of materials for replacing oil, fuel, and hydraulic fluids. Many operators include a cross-reference chart for NATO and U.S. lubricants as part of the AIP.	
120.	Electrical System and Batteries	Verify functionality of the generator and the compatibility of the aircraft's electrical system with any new battery installation or other system and component installation or modification. Avoiding overload conditions is essential because this is a known problem with the aircraft's electrical system. The F-86 has chronic generator problems.	
121.	Compass Detector Units	Inspect and check for cracks on the compass detector unit and replace as needed. One RAF squadron grounded all their aircraft as it was revealed that the compass detector unit had cracks in their brackets. New brackets for the compass detector were fabricated and installed.	
122.	Pitot/Static, Lighting, and Avionics and Instruments	Verify compliance with all applicable 14 CFR requirements (that is, § 91.411) concerning the pitot/static system, exterior lighting (that is, adequate position and anti-collision lighting), transponder, avionics, and related instruments.	
123.	Pitot Tube	Verify the AIP addresses the proper inspection of the pitot tube system.	

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124.	Oxygen System (General)	Emphasize inspection of the oxygen system and any modifications. Compliance with § 91.211, Supplemental Oxygen, is required. Recommend adherence to § 23.1441, Oxygen Equipment and Supply. Moreover, per FAA Order 8900.1, change 124, chapter 57, Maintenance Requirements for High-Pressure Cylinders Installed in U.S. Registered Aircraft Certificated in Any Category, each high-pressure cylinder installed in a U.S.-registered aircraft must be a cylinder manufactured and approved under the requirements of 49 CFR, or under a special permit issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA) under 49 CFR part 107. There is no provision for the FAA to authorize "on condition" for testing, maintenance, or inspection of high-pressure cylinders under 49 CFR (PHMSA).	
125.	Oxygen System	The AIP needs to emphasize the inspection of the oxygen system and any modifications as per the applicable USAF/RCAF/NATO guidance. Note: The RAF had oxygen regulators that were time expired and needed to be replaced. Inspect and replace the oxygen regulator as needed.	
126.	Other Pressure Cylinders	Emphasize the proper inspection of any pressure cylinders. Per FAA Order 8900.1 change 124, chapter 57, each high-pressure cylinder installed in a U.S.-registered aircraft must be a cylinder that is manufactured and approved under the requirements of 49 CFR, or under a special permit issued by PHMSA under 49 CFR part 107. There is no provision for the FAA to authorize "on condition" for testing, maintenance or inspection of high-pressure cylinders under 49 CFR. For example, the fire bottles are time sensitive items, and may have a limit of 5 years for hydrostatic testing. The issue is when the bottles are removed from the aircraft. It is industry knowledge that non-U.S. bottles may be installed as long as they are within their hydrostatic test dates. A problem arises when removing the bottles for hydrostatic testing. Maintenance programs require these bottles to be hydrostatic tested. Once the non-U.S. bottles are removed from the aircraft, they are not supposed to be hydrostatic tested, recharged, or reinstalled in any aircraft. Moreover, those bottles cannot be serviced (on board) after the testing date has expired.	
127.	Pneumatic System	Emphasize the inspection of the pneumatic system and any modifications.	
128.	Anti-G Suit System	Verify the serviceability of both aircraft systems (that is, anti-G valve) and the anti-G suit, if installed. There have been instances of anti-G valves being stuck in the open position. If the anti-G valve fails, it can blow scorching hot air into the cockpit. Note: A G suit, or the more accurately named anti-G suit, is a flight suit worn by aviators and astronauts who are subject to high levels of acceleration force (G). It is designed to prevent a blackout and G-induced loss of consciousness (G-LOC) caused by the blood pooling in the lower part of the body when under acceleration, thus depriving the brain of blood. Blackout and G-LOC have caused a number of fatal aircraft accidents.	
129.	Pressurization Vessel and Environmental Control	Verify the AIP incorporates the inspection of the pressurized sections of the aircraft as per the appropriate technical guidance (i.e., USAF, RCAF, NATO). Note pressure cycles and any repairs in the area. Verify the AIP incorporates related documentation and manuals.	
130.	Cockpit Instrumentation Markings	Verify all cockpit markings are legible and use proper English terminology and units acceptable to the FAA. The AIP should address inspection of all cockpit instruments with regular intervals for each subsystem. Care should also be taken to inspect modifications, including communications, navigation, or other upgrades to the cockpit. The AIP should address a cockpit indicator calibration process to ensure accurate indications for essential components.	
131.	Caution Light System	The AIP should include steps to verify and maintain the integrity of the caution light systems in the aircraft.	
132.	Safety Markings and Stenciling	Verify appropriate safety markings required by the technical manuals (that is, stenciling and "Remove Before Flight" banners) have been applied and are in English. These markings provide appropriate warnings/instruction regarding areas of the aircraft that could be dangerous. These areas include intakes, exhaust, air brakes, and ejection seats. In the case of ejections seat systems, and as noted in FAA Order 8130.2, paragraph 4074(e), "a special airworthiness certificate will not be issued before meeting this requirement."	
133.	Cockpit FOD	Verify the AIP addresses thorough inspection and cleaning of the cockpit area to preclude inadvertent ejection, flight control interference, pressurization problems, and other problems. This is a standard USAF/NAVAIR practice.	

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134.	Emergency Aileron Actuators	Ensure condition of the brackets holding hydraulic lines to the emergency aileron actuators are free from cracks. If brackets have cracks, replace prior to next flight operations. The RAF encountered this problem and needed to ground and inspect all their aircraft prior to their next flights.	
135.	Aileron Bungee(s)	Properly inspect aileron bungees for serviceability. An RAF squadron in the mid 1950s grounded most of their aircraft due to the un-serviceability of aileron bungees. Inspect and replace as necessary and set-up a periodic check in the maintenance manual for this issue.	
136.	Tailplane-Trim Actuator Brackets	Inspect tailplane-trim actuator brackets for cracking and serviceability. The RAF had inspected their F.Mk.2s & F.Mk.4s and found many of their aircraft unserviceable due to the tailplane-trim actuator brackets. They subsequently grounded their aircraft and had them replaced or re-manufactured them locally.	
137.	Rudder Trim Brackets	Inspect and replace rudder trim brackets for cracks or damage. For example, a whole RAF squadron was grounded when it was discovered that rudder trim brackets were cracked and/or damaged. They were replaced or re-manufactured locally.	
138.	Main Tail Bearing	Properly inspect and lubricate the main tail bearing for F-86 aircraft having the flying tail. An RAF pilot experienced from a rapid descent to final approach that on the flare for touchdown he could not move the stick aft. He touched down firmly and landed safely. Upon investigation, the crew disconnected the tail jack – the flying tail could not be moved by hand or full body weight. Differential freezing and heating had caused it to seize momentarily. It was also discovered that lubricating the main tail bearing was absent from the maintenance manual all together, even though there was a lubrication point for this bearing.	
139.	Main Landing Gear and Nose Wheel	Emphasize a detailed inspection of the main landing gear and nose-wheel system and adhere to USAF/RCAF inspection guidelines and maintenance requirements. With the landing gear, it has been documented that 10% of the major accidents of the F-86 through July 1953 were with the landing gear—2/3 of them being the nose gear. The USAF made progress with this issue – 12% for F-86A, 5% for F-86E, and 7% for F-86F. The landing gear is dependent upon a multitude of micro-switches, most of which are exposed to water and dirt splashed into the wheel wells. These switches are difficult to check and can only be checked properly on a jacked-up aircraft. Condition of the airfield is a key factor with this issue. The following F-86 pilot account illustrates the dangers of a nose-wheel steering failure: “Number three, Major Hill, then pulled up into the number two spot on Col. Jacob's wing for takeoff. Lucky thing he did, because that left me by myself as Number Three, and had I been on a wing when I tried to take-off, I probably would have hit the other plane. When I started rolling, my nose wheel steering went all out-of-kilter and I found myself rolling down the runway with a violent yawing action. I couldn't catch the plane with what was left of the nose wheel steering, and I wasn't going fast enough for the rudders to take hold. I tried to catch it with the brakes, but it was no use, so I stopcocked it and went sailing off on to the dirt. Luckily, I still wasn't going very fast and I was able to hold it fairly straight with what nose wheel steering I had left. Aside from scaring the living daylights out of the target men who were beside the runway, there was no damage to anyone or anything. Of all times to have it happen, though, I had to do it when Col. Hall was right there on the taxiway waiting to cross to Mobile. He was the first person there aside from the well-shaken men from the target crew. Of course, it wasn't long before everyone and his uncle was there.” http://www.fabulousrocketeers.com .	
140.	Tires and Wheels	Verify use of proper tires and/or equivalent substitutes (including inner tubes) and adherence to any tire limitation, such as allowed number of landings, inflation requirements, and the use of retreaded tires. The type of tire may dictate the number of landings. Wheels must be properly and regularly inspected and balanced. Take extra care and precaution on the type of runway being used with attention pre and post flight inspections. Many former military high-performance aircraft have a long history of tire failures, one of the leading causes of accidents. In fact, F-86 tires had the common problem of bursting causing numerous accident/incidents.	
141.	Undercarriage Up-lock System	Inspect for proper rigging on F-86 undercarriage up-lock system. The RAF in May 1955 encountered in their Sabre squadrons this issue subsequently grounding the aircraft followed by properly rigging the undercarriage up-lock system.	

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142.	Undercarriage Downlock Pins	Periodic inspection and the proper greasing of the F-86's undercarriage downlock pins. In the RAF, a particular squadron's aircraft trouble with the undercarriage system to remain down and locked. After the pilot recycled the landing gear several times, a leg of the landing gear refused to lock down and collapsed during the landing run. Investigation revealed that the downlock pins had not been greased and all aircraft were grounded while the situation was rectified.	
143.	Undercarriage Doors	Inspect undercarriage doors for proper fitting and locking. The RAF, and other F-86 operators, encountered that the undercarriage door would come open during flight—main or nose gear doors. The RAF had one squadron that had 4 of these events in just 1 month. Complete proper rigging of main and nose landing gear and thoroughly pre-flight and post-flight aircraft landing gear doors.	
144.	Wheel Flanges	Inspect wheel flanges for cracks during pre-flight inspection. This is a known safety issue with the F-86 well documented in RCAF service.	
145.	Explosives and Propellants	Check compliance with applicable Federal, State, and local requirements for all explosives and propellants in terms of use, storage, and disposal, in addition to verifying service (USAF/RCAF) requirements are followed.	
146.	HAZMAT	Recommend the AIP incorporates adequate provisions on HAZMAT handling. Refer to Gamauf, <i>Handling Hangar Hazmat</i> , August 2012.	
147.	In-Flight Canopy Separation	Ensure the AIP addresses the proper maintenance and operating condition of all canopy locks. Note: The original canopy actuators were a major problem, and it was found that pilots could neither release nor jettison the canopy in an emergency situation.	
148.	Canopy Seals	Test canopy seals for leaks (that is, use ground test connection).	
149.	Transparencies Problems	Ensure proper transparencies maintenance for safe operations. Monitor/inspect canopy for crazing every 10 hours of flight.	
150.	Emergency Canopy Jettison Mechanism	Verify the AIP includes testing the emergency canopy jettison mechanism, if so equipped. It must be functional and properly inspected per the applicable technical guidance.	
151.	Brake System	Emphasize a detailed inspection of the brake assemblies, adhere to applicable inspection guidelines and replacement times (i.e., USAF, RCAF, NATO), and consider more conservative inspections. Recommend brake inspection at 20 to 30 landings. The F-86 was involved in numerous runway over runs during its time in service.	
152.	Hoses and Cables	Inspect and replace hoses and cables appropriately. Due to the age of many of the former military high-performance aircraft, and in many cases, poor storage history, it is essential to ensure thorough inspections of all hoses and cables (multiple systems) and replace them in accordance with the guidance and requirements (i.e., USAF, RCAF, NATO).	
153.	Grounding	Verify adequate procedures are in place for grounding the aircraft. Static electricity could cause a fire or explosion, set off pyrotechnic cartridges, or result in any combination of the above. In grounding the aircraft, it is essential that all electrical tools are grounded, and industry-approved explosion-proof flashlights or other lighting sources be used.	
154.	TO 00-25-172	Use TO 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding, dated August 2012, as the baseline for all servicing functions. This manual describes physical and/or chemical processes that may cause injury or death to personnel, or damage to equipment, if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment.	
155.	Angle of Attack (AOA) System	If originally installed in the aircraft, ensure the AIP covers the adequate inspection and calibration of the AOA system and AOA indexer.	

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156.	Antennas	Verify any original antennas are compatible with all installed electronics. In addition, verify the AIP includes the appropriate inspections of the antennas. Some new avionics may impose airspeed limitations. Over the years, many different antennas were installed in this type of aircraft. For the basics on this issue, refer to Higdon, David. Aircraft as Antenna Farm. <i>Avionics</i> , Vol. 49, No. 9 (September 2012).	
157.	Hard Landings and Over G Situations	Verify hard landing and over-G inspection programs are adopted. This is especially important when acrobatics are performed or when the aircraft is involved in military support missions outside the scope of its experimental certificate (that is, PAO), and in light of safety concerns with the wing and flight control surface cracks and delamination. As a reference and examples see USAF T.O. 1F-86A-6, Section 5.	
158.	Nondestructive Inspection (NDI)	Ensure the AIP provides for all the required NDI or nondestructive testing under the appropriate guidance (i.e., USAF, RCAF, NATO).	
159.	Parts Fabrication	Verify engineering (that is, designated engineering representative) data supports any part fabrication by maintenance personnel. Unfortunately, many modifications are made without adequate technical and validation data. AC 43.18, Fabrication of Aircraft Parts by Maintenance Personnel, may be used as guidance.	
160.	Wing Root Cracking	Verify that the AIP provides for the inspection of the wings for any signs of wing root cracking. During the mid 1950's the Royal Air Force (RAF) operating Canadair F.Mk.2s & F.Mk.4s (J47-engined F-86E-equivalent models) experienced numerous problems with the wing roots cracking. In depth repair and strengthening was made depending on the category of the cracks on that specific aircraft. Recommend to check wing roots for cracking and if any repairs were made to existing aircraft.	
161.	Wings and Tail Bolts and Bushings	Ask about inspections and magnafluxing of wings, and tail bolts and bushings. Recommend the AIP incorporate other commonly used and industry-accepted practices involving NDI if not addressed in the manufacturer's maintenance and inspection procedures.	
162.	Horizontal Stab Bearing Inspection and Lubrication	Ask if the AIP includes required inspections and maintenance of the horizontal stab bearings. Failure to properly lubricate/inspect the bearings or improper reinstallation could result in loss/failure of the bearings and in-flight loss of control.	
163.	Landing Gear Retraction Test and Related Maintenance	Verify the AIP provides for the regular landing gear retraction test and related maintenance tasks, including documentation, per the applicable procedures and required equipment (i.e., USAF, RCAF, NATO).	
164.	Honeycomb Structures	Verify the AIP provides for the inspection and replacement of all bonded honeycomb structures per the applicable guidance (i.e., USAF, RCAF, NATO).	
165.	Small-Wing Fillet	Properly inspect the re-installation of the small wing fillet after pilot climbs in aircraft. Depending on make of F-86 aircraft, Sabre aircraft that have 'hard-edge' wings have a small wing fillet that needs to be removed when the door/step was lowered on the ground to allow pilot to climb in the aircraft. This happened to an RAF aircraft where the small wing fillet was not re-fitted after the pilot was in the aircraft, which led that aircraft to prematurely stall causing loss of aircraft and pilot.	
166.	Wing Bolts	Wing bolts must be checked regularly for corrosion.	
167.	Horizontal Stabilizer	If applicable to this F-86 model, ensure T.O. 1F-86D-236 is complied with to minimize over controlling & PIO.	
168.	Flying Controls (General)	Adhere to manufacturer's inspection guidelines for removal and NDT / lubrication of all flying controls (elevator, rudder, flaps, speed-brakes, ailerons).	
169.	Flight Control Balancing, Deflection, and Rigging	Verify flight controls were balanced per the applicable maintenance manual(s) (i.e., USAF, RCAF, NATO) after material replacement, repairs, and painting. Verify proper rigging and deflection. In several former military aircraft, damage to flight controls has been noticed when inadequate repairs have been performed. If there are no adequate records of the balancing of the flight controls, the airworthiness certificate should not be issued.	

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170.	Leading Edge Slats	If applicable to this F-86 model, the AIP must provide for the inspection and repair per the aircraft's maintenance instructions (USAF/RCAF). Asymmetric slat deployment is a major safety issue.	
171.	Flaps	The AIP must provide for the inspection and repair per the aircraft's maintenance instructions (USAF/RCAF).	
172.	Fuselage Speed Brakes	Verify proper condition, deflection, and warning signage of the speed brake as per the applicable guidance (i.e., USAF, RCAF, NATO). Verify proper condition (i.e., hydraulic) and deflection, and warning signage.	
173.	Yaw Damper	If installed, verify any the yaw damper is addressed in the AIP as per the applicable guidance (i.e., USAF, RCAF, NATO).	
174.	External Fuel Tanks	The AIP must ensure that the condition, installation, and removal of drop tanks are acceptable as per the applicable USAF/RCAF requirements. Verify drop tanks are cleared for use in the aircraft. The only modifications to the drop tanks should be to prevent jettison. Note: Inspect electrical system for proper operation of drop tanks if installed on F-86. In 1950s, the RAF experienced electrical problems with drop tanks whereby they would inadvertently release during flight. Strongly recommend that drop tanks not be installed on aircraft. If installed, must have separate conditional inspection with an authorized individual familiar with the drop tank's electrical system.	
175.	"Experimental" Markings	Verify the word "EXPERIMENTAL" is located immediately next to the canopy railing, on both sides, as required by § 45.23(b). Subdued markings are not acceptable.	
176.	N-Number	Verify the marking required by §§ 45.25 and 45.29(b) concerning the registration number (N-number), its location, and its size are complied with. If non-standard markings are proposed, verify compliance with Exemption 5019, as amended, under regulatory Docket No. 25731.	
177.	Type of Ejection Seat System	Identify the type of ejection seat fitted to the aircraft. The type of seat changes many aspects of operations and maintenance.	
178.	OEM Ejection Seat Support	Ask the applicant whether the ejection seat OEM still supports the ejection seat system, and whether it control part supplies. It is critical to clearly understand if and how the OEM supports both the earlier or upgraded ejections seat.	
179.	Ejection Seat System Maintenance	Ensure maintenance and inspection of the ejection seat and other survival equipment is performed in accordance with the applicable guidance (i.e., USAF, RCAF, NATO) by trained personnel. Include specific inspections and recordkeeping for pyrotechnic devices. Ejection seat system replacement times must be adhered to. No "on condition" maintenance may be permitted for rocket motors and propellants. Make the distinction between replacement times, that is, "shelf life" vs. "installed life limit." For example, a 9-year replacement requirement is not analogous to a 2-year installed limit. If such maintenance documentations and requirements are not available, the seat must be deactivated.	
180.	Ejection Seat Components Life Limit	Ensure life-limit requirements concerning the ejection seat are followed. No deviations or extensions should be permitted. If the seat is not properly maintained, including current pyrotechnics, it must be disabled.	
181.	Crew Harnesses	Verify the harness used by the crew is the required type for the ejection seat used. Accidents have been fatal because of harness issues.	
182.	Ejection Seat System Maintainers Training	Require adequate ejection seat training for maintenance crews. On May 9, 2012, an improperly trained mechanic accidentally jettisoned the canopy of a former military aircraft while performing maintenance and was seriously injured.	
183.	Ejection Seat Modifications	Prohibit ejection seat modifications unless directly made by the manufacturer or permitted under the applicable and current technical guidance (i.e., USAF, RCAF, NATO).	
184.	Ground Support Equipment Maintenance	Verify the AIP provides for the proper maintenance of all required approved ground support equipment for the aircraft. Related technical guidance must be available as well.	

Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
185.	Accurate Weight & Balance (W&B)	<p>Review original W&B paperwork. Verify adherence to the applicable guidance (i.e., USAF, RCAF, NATO) as well as FAA-H-8083-1, Aircraft Weight and Balance Handbook, if documentation by the applicant appears to be inadequate. Several former military aircraft accidents have been linked to center of gravity miscalculations. The following extract from a NTSB F-86 accident report (fatal) illustrates the need for adequate W&B: "The ...Project Manager submitted his initial copy of the NTSB Pilot/Operator Aircraft Accident Report to the FAA Accident Investigator-In-Charge (IIC) on August 26, 2006. Performance documentation given to the FAA by the project manager indicated the maximum gross weight of the airplane for takeoff was 17,300 pounds. Weight and balance computations also showed that the weight of the airplane at the time of the accident was 17,705 pounds. These computations were based on weight and balance figures submitted to the FAA by the project manager on a spreadsheet dated August 22, 2004. The FAA was informed by the project manager that the computations on this document were based on the 120 gallon drop tanks configuration, not the 200 gallon drop tanks configuration which was on the aircraft at the time of the accident. The FAA computed the takeoff weight to be 17,693 pounds. The FAA weight and balance computations were based on data extracted from the document provided by the project manager on July 26, 2006. Examination of the weight and balance spread sheet data by the FAA revealed the fuel was not added back to the net empty weight in order to compute the take off weight by the project manager. The FAA pointed out this error to the project manager on August 4, 2006. The project manager submitted an e-mail with a second weight and balance-spread sheet to the FAA on August 4, 2006, which included 2 additional weight and balance computations. The first computation in the far left column indicated a takeoff weight of 16,863 pounds. The second column indicated a takeoff weight of 16,963 pounds. Review of the computations by the FAA revealed the Pilot and parachute weight of 230 pounds and the ballast weight of 400 pounds were included in the full weight center of gravity computation on the left column computation. The FAA compared this figure to the document received on July 27, 2006, and noted the pilot and parachute weight of 230 pounds and the ballast weight of 400 pounds were not included in the full weight center of gravity that was added afterwards by the project manager. The second column computation used a net weight of 10,396 pounds. The project manager did not use this computation on the previous computations. The FAA asked the project manager where the 10,396 pounds came from. The project manager informed the FAA the airplane was reweighed at Mojave due to several modifications over a seven-month period. The FAA requested the project manager to send them the source document from this reweighing. The project manager provided a hand written document without a letterhead, signature, and address of the person who completed the work. When the FAA questioned the project manager about this, the project manager stated an airframe and power plant mechanic (A&P) who was responsible for weighing the airplane was unable to find any paper work to support his computations. The project manager stated the A&P mechanic faxed a copy of the weight and balance data and that he was going to provide the FAA with an affidavit. The FAA has not received an affidavit from the project manager or the A&P mechanic. The FAA calculated the take off weight with the second undocumented figures provided by the project manner to be 16,963 pounds."</p>	

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F-86 Operating Limitations and Operational Issues			
186.	AIP and Related Documentation	Require adherence to the AIP and related documentation as part of the operating limitations.	
187.	Understanding of the Operating Limitations	Require the applicant to sign the Acknowledgment of Special Operating Limitations form.	
188.	Pilot in Command (PIC) Requirements	Ensure the operating limitations address PIC requirements. Direct transition from a modern corporate jet to a high-performance former military aircraft with minimum training is not a safe practice. Refer to the appropriate plot training and checking requirements in FAA Order 8900.1, volume 5, chapter 9, section 2. In addition to holding the required Experimental Authorization, the PIC should have (1) 20 hours dual training in a high-performance trainer (T-33) in preparation for pilot authorization flight check, (2) a structured ground school (similar to an USAF Short Course), (3) 500 hours in high performance fighter/fighter bomber experience, (4) proficiency and currency of 3 hours per month and 5-6 takeoffs and landings (refer to Recent Flight Experience, below), and (5) follow standard USAF/RCAF/NATO proficiency standardization check procedures. F-86 aircraft have certain characteristics not familiar to other civilian aircraft, including most corporate jets. These include ejection seats, high-speed flight, aerobatic capability, swept wings, and complex systems that may be unfamiliar to many. The long spool time of the F-86 engines is also an important issue.	
189.	Recent Flight Experience	Recommend proficiency and currency of 3 hours per month and 5-6 takeoffs and landings. The typical general experience of "at least three takeoffs and three landings within the preceding 90 days" is not sufficient for the safe operation of the aircraft.	
190.	F-86 Differences Training	Recommend that the applicant/operator make provide for differences training between F-86 models. For example, if a pilot has had recent experience in a F-86A, transitioning to the F-86E should include some training in the differences, such as differences in the engine, instrumentation, switches, and ejection seats.	
191.	PIC Currency in Number of Aircraft	Recommend the operator limit the number of tactical jets the PIC stays current on. The USAF and USN restrict the number of aircraft types a pilot could hold currency on to two or three. This should be considered by operators who have several aircraft types in their inventory.	
192.	Flight Manuals	Ensure the PIC operates the aircraft as specified in the most current version of the flight manual (i.e., USAF -1, RAF Pilot Notes) for the version of the aircraft being flown.	
193.	Checkout Procedures	Recommend the establishment of a pilot checkout certification process similar to the military operator, as part of the Experimental Authorization. This training should include a structured ground school process and documentation covering the operation of the aircraft with an emphasis on emergency procedures.	
194.	Annual Checkout	Recommend the PIC conduct an annual checkout on the aircraft.	
195.	Adequate Annual Program Letter	Verify the applicant's annual program letter contains sufficient detail and is consistent with applicable regulations and policies. (Many applicants/operators submit inadequate and vague program letters or fail to submit them on an annual basis.) Also verify the proposed activities (for example, an air show at a particular airport) are consistent with the applicable operating limitations (for example, avoiding populated areas) and do not pose a safety hazard, such as the runway being too short. There may be a need to review the proposed airports to be used.	

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196.	Additional Program Letter Guidance	<p>Ensure program letters accompanying an application for an experimental airworthiness certificate meet the requirements of § 21.193. The letter must be detailed enough to permit the FAA to prescribe the conditions and limitations necessary to ensure safe operation of the aircraft. The letter must include—</p> <ol style="list-style-type: none"> 1. The purpose for which the aircraft is to be used (such as R&D, crew training, or exhibition). 2. The purpose of the experiment; purpose of the experiment, aircraft configuration or modifications, and outline the program objectives. 3. The estimated number of flights or total flight hours required for the experiment and over what period of time (for example, days or months). 4. The areas over which the experiment will be conducted. A written description or annotated map is acceptable. Specifically describe the area. Describing the operating area as “the 48 states,” is not acceptable. The FAA may establish boundaries of the flight test area, including takeoff, departure, and landing approach routing to minimize hazards to persons, property and other air traffic. 5. Unless converted from a type certificated aircraft, three-view drawings or three-view dimensioned photographs of the aircraft. 6. Any pertinent information found necessary by the FAA to safeguard the general public. The letter must also include any exemptions that may apply to the aircraft, such as non-standard markings or using an experimental aircraft for hire. 7. If using the aircraft for multiple purposes or roles, (1) documentation of all operations for each purpose, (2) a description of any configuration changes that will occur between each purpose to include adding or removing external stores and enabling or disabling systems, and (3) a separate section for each purpose. For example, an aircraft could have an experimental airworthiness certificate for the purposes of R&D and exhibition. The same aircraft may also conduct military, State, or PAO. In this example, the program letter must describe all three roles with the same level of detail. While the airworthiness certificate is not in effect, nor can the FAA prescribe limitations for PAO, the FAA cannot determine the appropriate certification for the aircraft without knowledge of how the aircraft is used. <p>SAMPLE— Research and Development / Exhibition - Applicant Program Letter for a Special Airworthiness Certificate</p> <ul style="list-style-type: none"> • Registered Owner (as shown on Certificate of Aircraft registration): <i>NAME: Brand X Support Services, Inc., ADDRESS: 123 Airport Street, Any Town, USA 00010.</i> Aircraft Description: Registration Marks, Aircraft Yr. Mfg, and Aircraft Model Designation: North American F-100. <p><u>R&D</u></p> <ul style="list-style-type: none"> • Describe program purpose for which the aircraft is to be used (14 CFR 21.193(d)(1)), i.e., <i>R&D providing chase for Major Airplane Manufacturer for certification testing of their next business jet. Aircraft Certification Office X is the project office. The assigned project number is ACOXzzz;</i> • Provide the following information as it pertains to your Program Letter (a) List estimated flight hours required for program, i.e. 75 hours, (b) List estimated number of flights required for program, number of flights, i.e. 50, (d) List estimated duration for programs (14 CFR § 21.193(d)(2)). • Describe the areas over which the flights are to be conducted, and address of base operation (14 CFR 21.193(d)(3)), i.e., <i>the flights will take place within 150 nm of airport KAAA, excluding the airspace over City-X. The maximum altitude is FL240. The base of operations is Major Airplane Manufacturer Hangar, 12345 Tower Drive, City, etc.;</i> • Describe the aircraft configuration (attach three-view drawings or three-view dimensioned photographs of the aircraft (14 CFR 21.193(d)(4) and include a description of how the configuration is different from the other purposes listed). <i>See attached.</i> <p><u>Exhibition</u></p> <ul style="list-style-type: none"> • Describe program purpose for which the aircraft is to be used (14 CFR 21.193(d)(1)) such as <i>exhibition at the following events this year...;</i> • Provide the following information as it pertains to your Program Letter (a) list estimated flight hours required for program, i.e., <i>13 hours exhibition, including the flights to and from the events. 10 hours for crew training;</i> (b) list estimated number of flights required for program, and (c) list estimated duration for programs (14 CFR § 21.193(d)(2)), i.e. <i>8 months;</i> • Describe the areas over which the flights are to be conducted, and address of base operation (14 CFR 21.193(d)(3)), i.e. <i>crew training flights will take place within 125 nautical miles of Any Town, USA airport with a maximum altitude of 10,000 feet.</i> • Describe the aircraft configuration (attach three-view drawings or three-view dimensioned photographs of the aircraft (14 CFR 21.193(d)(4) and include a description of how the configuration is different from the other purposes listed). <i>See attached;</i> • Date, Name and Title (Print or Type), and Signature. 	

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197.	Flight Manual Warnings, Cautions, and Notes	Consider requiring review (before flight) of all flight manual warnings, cautions, and notes. Such a review will greatly enhance safety, especially in those cases where the PIC does not maintain a high level of proficiency in the aircraft. The following definitions apply to warnings, cautions, and notes found throughout this instruction. Warning: Explanatory information about an operating procedure practice, or condition, that may result in injury or death if not carefully observed or followed. Caution: Explanatory information about an operating procedure, practice, or condition, that may result in damage to equipment if not carefully observed or followed. Note: Explanatory information about an operating procedure, practice, or condition that must be emphasized.	
198.	Operating Limitations	The PIC must operate the aircraft as specified in section discussing Operating Limitations, in addition to the FAA-approved operating limitations.	
199.	Safety Supplements	Verify the applicant/operator has incorporated the applicable safety supplements into operational guidance as appropriate. The most current version of the AFM/NATOPS/Pilot Notes usually provides a listing of affected safety supplements and this can be used as a reference.	
200.	Foreign Aircraft Particularities and Restrictions	Verify whether the aircraft includes aircraft-specific restrictions if it is of foreign origin. If those restrictions exist, the operator must understand those restrictions before flight, especially any post-restoration flight.	
201.	Maintenance and Line Support	Verify the aircraft is operated with qualified crew chief/plane captains, especially during preflight and post-flight inspections as well as assisting the PIC during startup and shutdown procedures.	
202.	Ejection Seat System PIC Training	Require adequate ejection seat training for the PIC and crew, if applicable, for the type of seat installed. The PIC must also be able to ensure any additional occupant is fully trained on ejection procedures and alternate methods of escape. Evidence shows the safety record of attempted ejections in civilian former military aircraft is very poor, typically indicating inadequate training leading to ejections outside of the envelope. The ejection envelope is a set of defined physical parameters within which an ejection may be successfully executed.	
203.	Ejection Seat System Ground Safety	Verify the safety of ejection seats on the ground. Verify ejection seats cannot be accidentally fired, including prohibiting untrained personnel from sitting on the seats. As NAVAIR states, "the public shall be denied access to the interior of all aircraft employing ejection seats or other installed pyrotechnic devices that could cause injury." In addition, operators should provide security during the exhibition of the aircraft to prevent inadvertent activation of the ejection system from inside or outside the aircraft by spectators or onlookers. The PIC on a recent jet warbird operation noted: "Recently we had a case where a guest in the back jettisoned the rear canopy on the ground at the parking position while trying to lock the canopy with the lever on the R/H side... The canopy went straight up for 6 m (20 ft) and fell back on the ground, right in front of the left wing leading edge next to the rear cockpit (fortunately not straight back on the cockpit to punish the guy)." Note: Any ejection seat training must include survival and post-bailout procedures, based either on U.S. Navy or USAF training (or NATO), as appropriate for the equipment being used. Note: As a result of accidents, DOD policy prohibits the public from sitting on armed ejection seats.	
204.	Ejection Seat System Safety Pins	Require the PIC to carry the aircraft's escape system safety pins on all flights and high-speed taxi tests. As a recommendation stemming from a fatal accident, the U.K. CAA may require "operators of civil registered aircraft fitted with live ejection seats to carry the aircraft's escape systems safety pins (a) on all flights and high-speed taxi tests (b) in a position where they are likely to be found and identified without assistance from the aircraft's flight or ground crews."	
205.	Parachutes	Comply with § 91.307, Parachutes and Parachuting. This regulation includes requirements that the parachute must (1) be of an approved type and packed by a certificated and appropriately rated parachute rigger, and (2) if of a military type, be identified by an NAF, AAF, or AN drawing number, an AAF order number, or any other military designation or specification number. The parachute must also be rated for the particular ejection seat being used. Note: The F-86 ejection seat system does not incorporate the parachute as part of the seat but rather the parachute is worn by the pilot.	
206.	Engine Operating Limits	Adhere to all engine limitations in the applicable flight manuals.	

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207.	Spool Down Time	Verify the AIP incorporates action(s) following a change in the spool down time of the engine(s) after shutdown. This is critical as it could be an indicator of an upcoming problem with the engine.	
208.	External Stores	Prohibit the installation of external stores that were not approved by the military service, i.e., USAF, RCAF, NATO. Under FAA Order 8130.2, only aircraft certificated for the purpose of R&D may be eligible to operate with functional jettisonable external fuel tanks or stores, but the safety of people and property on the ground still has to be addressed. As the NTSB stated in 2012 following the fatal accident of a high-performance experimental aircraft, "the fine line between observing risk and being impacted by the consequences when something goes wrong was crossed." In many cases, the pilots may understand the risks they assumed, but the spectators' presumed safety has not been assessed and addressed. See <i>Speed and Maneuver Limitations Due to External Stores or External Fuel Tanks</i> below.	
209.	Speed and Maneuver Limitations Due to External Stores or External Fuel Tanks	Some F-86 operators may have installed either drop tanks or external stores that will decrease allowable airspeeds and maneuvers the aircraft is able to perform. Depending on size of drop tanks (120 or 200 gallons) and external stores, 555 IAS is the maximum. The Mach number will vary depending on the altitude.	
210.	(JATO) Rockets	Prohibit the use of JATO rockets.	
211.	Emergency Stores Release Handle (ESRH)	Disable the ESRH, if applicable.	
212.	Master Armament Switch	Disable and disconnect the master armament switch from any system. Weapon-related buttons (bomb/rocket button, trigger) on the control stick grip and panels must also be disabled and disconnected from all systems.	
213.	Restrict Acrobatics	Restrict acrobatics per the appropriate flight manual.	
214.	Mach Meter and Airspeed Calibration	Require the installation and calibration of a Mach meter or verify the PIC makes the proper Mach determination before flight. Unless the airspeed indicator is properly calibrated, transonic range operations may have to be restricted.	
215.	Accelerometer	If provided, ensure the aircraft's accelerometer is functional. This instrument is critical to remain within the required G limitation of the aircraft.	
216.	G Limitations	Recommend that conservative G limits be imposed on the operation of the aircraft, i.e., +3G and -1G. Operations should avoid high speed and high G loads. Note: It was noted that a pilot flying the Sabre Mk. 4 commented that at high speeds and G loads the Sabre becomes unstable in that it suddenly starts to tighten up and increase the G load automatically, possibly beyond the limit unless it is checked quickly.	
217.	High-Speed Restrictions and Controllability	Recommend limiting transonic operations by 10 percent below MMO. This provides a good safety margin and could be addressed in the operating limitations, the AFM, and related SOPs. MMO is the maximum operating limit speed (V_{MO} / M_{MO} airspeed or Mach Number, whichever is critical at a particular altitude) is a speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent). Flight characteristics begin to change above Mach 0.9. Above Mach 0.9, wing heaviness is encountered along with a normal nose-up tendency and a gradual increase in moving the stick forward is needed. Note: Models prior to the F-86E were prone to aileron and rudder buzz and required very high stick forces. Models without the fully moving tail have poor pitch control at high speed.	
218.	Phase I Flight Testing	Recommend, at a minimum, all flight tests and flight test protocol(s) follow the intent and scope of acceptable USAF/U.S. Navy functionality test procedures. The aircraft needs detailed Phase I flight testing for a minimum of 10 hours. Returning a high-performance aircraft to flight status after restoration cannot be accomplished by a few hours of "flying around." Safe operations also require a demonstrated level of reliability.	
219.	Post-Maintenance Check Flights	Recommend post-maintenance flight checks be incorporated in the maintenance and operation of the aircraft and TO 1-1-300, Maintenance Operational Checks and Flight Checks, dated June 15, 2012, be used as a reference.	

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220.	Flight Over Populated Areas	Per FAA order 8130.2, as amended, prohibit flights over populated areas, including takeoffs and landings. While the experimental category may allow a reduced level of safety for the aircraft when compared to a standard category aircraft, an equivalent level of safety for the public must be maintained. Consider restricting the aircraft to blocks of airspace removed from populated areas, not just over flight of such areas. In all instances, there must be adequate and detailed egress and ingress routes in and out of all airports that are used to avoid flights over and near populated areas.	
221.	Controlled Bailout Area	If operational procedures require the establishment of a controlled bailout area, ensure it (1) does not endanger people or property on the ground in any way, (2) follows established USAF/NAVAIR procedures, and (3) addresses the possibility of erratic flight paths after ejections. Refer to <i>Flight Over Populated Areas</i> above.	
222.	G Limitations	Ensure that there are conservative G limits. Many of these aircraft have structural problems dictating this prudent approach. There is no justification to take the aircraft anywhere near its original limitations. The fact that the aircraft could be G loaded does not mean such performance should be attempted or is inherently safe. This is especially true given the aircraft's age and historical use. Maximum G limits should be established below design specifications based on the age and condition of the airframe. Particular attention to the condition of the wings is required because in-flight breakups with the original wings have occurred recently.	
223.	Visual Meteorological Condition (VMC) and Instrument Flight Rules (IFR) Operations	Recommend only day VMC operations. If IFR operations are permitted, prohibit operations in known icing conditions, as the aircraft is not properly equipped for icing conditions. Comply with § 91.205.	
224.	Carrying of Passengers, § 91.319(a)(2)	Prohibit the carrying of passengers (and property) for compensation or hire at all times. For hire flight training is permitted only in accordance with an FAA-issued letter of deviation authority (LODA).	
225.	Passenger Training and Limitations	Implement adequate training requirements and testing procedures if a person is carried on the back seat [refer to <i>Carrying of Passengers, § 91.319(a)(2)</i> above for limitations under § 91.319(a)(2)] to allow the performance of that crew's position responsibilities per the applicable Crew Duties section of the USAF Flight Manual. This training should not be a simple checkout, but rather a structured training program (for example, ground school on aircraft systems, emergency and abnormal procedures, "off-limits" equipment and switches, and actual cockpit training). The back seat qualification should also include (1) ground egress training (FAA-approved ejection seat training), (2) ejection seat and survival equipment training, (3) abnormal/emergency procedures, and (4) normal procedures. In addition to any aircraft-specific (that is, systems and related documentation) training, it is recommended that the <i>Naval Aviation Survival Training Program</i> (Non-aircrew NASTP Training) or/and the <i>United States Air Force Aerospace Physiology Program</i> (AFI 1 I-403, Aerospace Physiological Training Program) be used in developing these programs. In addition, passenger physiological and high-altitude training should be implemented for all operations above 18,000 ft. This issue can be addressed as part of the operating limitations by requiring the right seat training and incorporating the adequate reference (name) of the operator's training program.	
226.	Spins	Prohibit spins.	
227.	Reduce Vertical Separation Minimums (RVSM)	Prohibit operations above RVSM altitudes (FL290).	
228.	High-Altitude Training	Recommend the PIC complete an FAA-approved physiological training course (for example, altitude chamber). Refer to FAA Civil Aerospace Medical Institute (CAMI) Physiology and Survival Training website for additional information.	
229.	Minimum Equipment for Flight	Ask the applicant to specify minimum equipment for flight per applicable USAF guidance, and develop such a list consistent with the applicable requirements (i.e., USAF, RCAF, NATO) and § 91.213. These documents list the minimum essential systems and subsystems that must work on an aircraft for a specified mission.	

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230.	Post-flight and Last Chance Check Procedures	Recommend the establishments of post-flight and last chance inspection per the applicable guidance (i.e., USAF, RCAF, NATO). Note: Last chance checks may include coordination with the airport and ATC for activity in the movement areas.	
231.	Barrier MA-1, MA-1A, and BAK-15	Recommend the use of a barrier (MA-1A) system be considered where available. If a barrier system is used, ensure procedures be developed for this. Refer to AC 150/5220-9, Aircraft Arresting Systems on Civil Airports, dated December 20, 2006. The military installs and maintains aircraft arresting systems when certain military operations are authorized at civil airports. Aircraft arresting systems serve primarily to save lives by preventing aircraft from overrunning runways in cases where the pilot is unable to stop the aircraft during landing or aborted takeoff operations. They also serve to save aircraft and prevent major damage. Aircraft arresting systems must be installed according to the latest official criteria of the military aircraft operational need. In most cases, the criteria can be found in AF 32-1043, Managing, Operating, and Maintaining Aircraft Arresting Systems.	
232.	Jet Exhaust Dangers	Establish adequate jet blast safety procedures per the appropriate guidance (i.e., USAF, RCAF, NATO).	
233.	Servicing and Flight Servicing Certificate	Ensure the applicant verifies ground personnel are trained for operations with an emphasis on the potential for fires during servicing. Prohibit non-trained personnel from servicing the aircraft. Recommend a Flight Servicing Certificate or similar document be used by the ground personnel to attest to the aircraft's condition (that is, critical components such as tires) before each flight to include the status of all servicing (that is, liquid levels, fuel levels, hydraulic fluid, and oxygen). Specific servicing areas may include: oxygen tanks and filler, fuel fillers, engine oil tank, brake control units, batteries, external power receptacles, rain removal system, single-point refueling (needs to be disabled), emergency air bottle and filler, and hydraulic reservoir.	
234.	Ground Support Equipment	Verify all required ground equipment is available and in a serviceable condition.	
235.	Aerial Target Towing	Restrict all aerial towing. Notwithstanding the standard language in the FAA Order 8130.2 limitations concerning towing, the aircraft is not to be used for towing targets because such operations pose a danger to property and people on the ground and endanger the aircraft.	
236.	Hot and Pressure Refueling	Prohibit hot and pressure refueling. There are too many dangers with these types of operations. A single refueling point is located on the lower fuselage. Each engine is fed by a separate and independent fuel system, with the center and aft fuselage tanks for the port engine and the forward fuselage tank and dorsal tank for the starboard engine.	
237.	Personal Flight Equipment	Recommend the operator use the adequate personal flight equipment and attire to verify safe operations. This includes a helmet, oxygen mask, fire retardant (Nomex) flight suit, gloves (that is, Nomex or leather), adequate foot gear (that is, boots), and clothing that does not interfere with cockpit systems and flight controls. Operating with a live ejection seat requires a harness. Therefore, recommend only an approved harness compatible with the ejection seat be used.	
238.	Coordination With Airport	The applicant must provide objective evidence that the airport manager of the airport where the aircraft is based has been notified regarding both the presence of explosive devices in these systems and the planned operation of an experimental aircraft from that airport.	
239.	ATC Coordination	Coordinate with ATC before any operation that may interfere with normal flow of traffic to ensure the requirement to avoid flight over populated areas is complied with. Note: ATC does not have the authority to waive any of the operating limitations or operating rules.	
240.	Formation Takeoffs and Landings	Prohibit formation takeoffs and landings. There is no civil use, including display, to justify the risks involved.	

Issue #	Issue(s)	Recommended Review, Action(s), and Coordination with Applicant	Notes, Action(s) Taken, and Disposition
241.	ARFF Coordination	Coordinate with Aircraft Rescue and Fire Fighting (ARFF) personnel at any airport of landing. A safety briefing should be provided and include: an ejection seat system overview; making the ejection seat safe, including location and use of safety pins; canopy jettison; fuel system, fuel tanks; intake dangers, engine shut-off throttle; fuel; batteries; flooding the engines; fire access panels and hot exhaust ports; and crew extraction-harness, oxygen, communications, and forcible entry. ARFF personnel should be provided with the relevant sections of the aircraft AFM and other appropriate references like Fire Fighting and Aircraft Crash Rescue, Vol. 3, Air University, Maxwell AFB, 1958. An additional reference is the NATOPS U.S. NAVY Aircraft Firefighting and Rescue Manual, NAVAIR 00-80R-14, dated October 15, 2003. The FAA maintains a series of ACs that provide guidance for Crash Fire Rescue personnel. Refer to AC 5210-17, Programs for Training of Aircraft Rescue and Firefighting. Note: On November 1, 2012, the NTSB issued Safety Recommendation A-12-64 through -67. The NTSB recommends the FAA require the identification of the presence and type of safety devices (such as ejection seats) that contain explosive components on the aircraft. It further stated that that information should be readily available to first responders and accident investigators by displaying it on the FAA's online aircraft registry and that the FAA should issue and distribute a publicly available safety bulletin to all 14 CFR part 139-certificated airports and to representative organizations of off-airport first responders, such as the International Association of Fire Chiefs and the National Fire Protection Association, to (1) inform first responders of the risks posed by the potential presence of all safety devices that contain explosive components (including ejection seats) on an aircraft during accident investigation and recovery, and (2) offer instructions about how to quickly obtain information from the FAA's online aircraft registry regarding the presence of these safety devices that contain explosive components on an aircraft.	
242.	Military/Public Aircraft Operations	Require the operator to obtain a declaration of PAO from the contracting entity or risk civil penalty for operating the aircraft outside the limits of the FAA experimental certificate. Some operators may enter into contracts with the DOD to provide military missions such as air combat maneuvering, target towing, and ECM. Such operations constitute PAO, not civil operations under FAA jurisdiction. Verify the operator understands the differences between PAOs and operations under a civil certificate. For example, the purpose of an airworthiness certificate in the exhibition category is limited to activities listed in § 21.191(d). Note: The following notice, which was issued by AFS-1 in March 2012, needs to be communicated to the applicant: "Any pilot operating a U.S. civil aircraft with an experimental certificate while conducting operations such as air-to-air combat simulations, electronic counter measures, target towing for aerial gunnery, and/or dropping simulated ordinances is operating <i>contrary</i> to the limits of the experimental certificate. Any operator offering to use a U.S. civil aircraft with an experimental certificate to conduct operations such as air-to-air combat simulations, electronic counter measures, target towing for aerial gunnery, and/or dropping simulated ordinances pursuant to a contract or other agreement with a foreign government or other foreign entity would not be doing so in accordance with any authority granted by the FAA as the State of Registry or State of the Operator. These activities are not included in the list of experimental certificate approved operations and may be subject to enforcement action by FAA. For those experimental aircraft operating overseas <i>within</i> the limitations of their certificate, FAA Order 8130.2, section 7, paragraph 4071(b) states that if an experimental airworthiness certificate is issued to an aircraft located in or outside of the United States for time-limited operations in another country, the experimental airworthiness certificate must be accompanied by appropriate operating limitations that have been coordinated with the responsible CAA <i>before</i> issuance." For additional information on public aircraft status, refer to 76 FR 16349, Notice of Policy Regarding Civil Aircraft Operators Providing Contract Support to Government Entities (Public Aircraft Operations), dated March 23, 2011.	
243.	TO 00-80G-1 and Display Safety	Recommend using TO 00-80G-1, Make Safe Procedures for Public Static Display, dated November 30, 2002, in preparing for display of the aircraft. This document addresses public safety around aircraft in the air show/display environment. It covers hydraulics, egress systems, fuel, arresting hooks, electrical, emergency power, pneumatic, air or ground launched missiles, weapons release (including inert rounds), access panels, antennas, and other equipment that can create a hazard peculiar to certain aircraft.	
244.	Runway Considerations	Consider accelerate/stop distances, balanced field length, and critical field length in determining acceptable runway use per CJAA guidance. To enhance operations, it is recommended takeoff procedures similar to the USAF minimum acceleration check speed (using a ground reference during the takeoff run to check for a pre-calculated speed) be adopted.	

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245.	Minimum Runway Length	<p>Recommend a minimum runway length of 7,000 feet. In addition, ensure the PIC verifies, using the appropriate aircraft performance charts (Performance Supplement), sufficient runway length is available considering field elevation and atmospheric conditions. To add a margin of safety, use the following:</p> <p><u>For Takeoff</u></p> <ul style="list-style-type: none"> • No person may initiate an airplane takeoff unless it is possible to stop the airplane safely on the runway, as shown by the accelerate-stop distance data, and to clear all obstacles by at least 50 ft vertically (as shown by the takeoff path data) or 200 ft horizontally within the airport boundaries and 300 ft horizontally beyond the boundaries, without banking before reaching a height of 50 ft (as shown by the takeoff path data) and after that without banking more than 15 degrees. • In applying this section, corrections must be made for any runway gradient. To allow for wind effect, takeoff data based on still air may be corrected by taking into account not more than 50 percent of any reported headwind component and not less than 150 percent of any reported tailwind component. <p><u>For Landing</u></p> <ul style="list-style-type: none"> • No person may initiate an airplane takeoff unless the airplane weight on arrival, allowing for normal consumption of fuel and oil in flight (in accordance with the landing distance in the AFM for the elevation of the destination airport and the wind conditions expected there at the time of landing), would allow a full stop landing at the intended destination airport within 60 percent of the effective length of each runway described below from a point 50 ft above the intersection of the obstruction clearance plane and the runway. For the purpose of determining the allowable landing weight at the destination airport, the following is assumed: <ul style="list-style-type: none"> ○ The airplane is landed on the most favorable runway and in the most favorable direction, in still air. <p>The airplane is landed on the most suitable runway considering the probable wind velocity and direction and the ground handling characteristics of that airplane, and considering other conditions such as landing aids and terrain.</p>	

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F-86 Risk Management, SOPs, and Best Practices			
246.	Use of Operational Risk Management (ORM)	Recommend an ORM-like approach be implemented by the owner/operator. ORM employs a five-step process: (1) Identify hazards, (2) Assess hazards, (3) Make risk decisions, (4) Implement controls, and (5) Supervise. The use of ORM principles will go a long way in enhancing the safe operation of the aircraft. ORM is a systematic decision-making process used to identify and manage hazards. ORM is a tool used to make informed decisions by providing the best baseline of knowledge and experience available. Its purpose is to increase safety by anticipating hazards and reducing the potential for loss. The ORM process is utilized on three levels based upon time and assets available. These include: (1) Time-critical: A quick mental review of the five-step process when time does not allow for any more (that is, in-flight mission/situation changes); (2) Deliberate: Experience and brain storming are used to identify hazards and is best done in groups (that is, aircraft moves, fly on/off); and (3) In-depth: More substantial tools are used to thoroughly study the hazards and their associated risk in complex operations. The ORM process includes the following principles: accept no unnecessary risk, anticipate and manage risk by planning, and make risk decisions at the right level.	
247.	System Safety MIL-STD-882B	Recommend the use of MIL-STD-882B, System Safety Program Requirements, in the operation of the aircraft. This guidance is also useful in the maintenance and operation of high-performance former military aircraft. It covers program management, risk identification, audits, and other safety-related practices.	
248.	Cockpit Resource Management (CRM) and Single-Pilot Resource Management (SRM)	Recommended the applicant and operator adopt a CRM-type program for aircraft operations. While CRM focuses on pilots operating in crew environments, many of the concepts apply to single-pilot operations. Many CRM principles have been successfully applied to single-pilot aircraft, and led to the development of SRM. SRM is defined as the art and science of managing all the resources (both on board the aircraft and from outside sources) available to a single pilot (prior and during flight) to ensure the successful outcome of the flight. SRM includes the concepts of Risk Management (RM), Task Management I, Automation Management (AM), Controlled Flight Into Terrain (CFIT) Awareness, and Situational Awareness (SA). SRM training helps the pilot maintain situational awareness by managing the automation and associated aircraft control and navigation tasks. This enables the pilot to accurately assess and manage risk and make accurate and timely decisions. Integrated CRM/SRM incorporates the use of specifically defined behavioral skills into aviation operations. Standardized training strategies are to be used in such areas as academics, simulators, and flight training. Practicing CRM/SRM principles will serve to prevent mishaps that result from poor crew coordination. At first glance, crew resource management for the single pilot might seem paradoxical but it is not. While multi-pilot operations have traditionally been the focus of CRM training, many elements are applicable to the single pilot operation. The Aircraft Owners and Pilots Association's (AOPA) Flight Training described single-pilot CRM as "found in the realm of aeronautical decision making, which is simply a systematic approach that pilots use to consistently find the best course(s) of action in response to a given set of circumstances." Wilkerson, Dave. September 2008. From a U.S. Navy standpoint, OPNAVINST 1542.7C, Crew Resource Management Program, dated October 12, 2001, can be used as guidance. Also refer to CRM For the Single Pilot. <i>Vector</i> (May/June 2008). FAA guidance includes: Summers, Michele M., Ayers, Frank Ayers, Connolly, Thomas Connolly, and Robertson, Charles. <i>Managing Risk through Scenario Based Training, Single Pilot Resource Management, and Learner Centered Grading</i> , 2007, and Chapter 17, <i>Airplane Flying Handbook</i> FAA-H-8083-3A. Note: Consider the use of AFI 11-290/AETC Sup 1, Cockpit/Crew Resource Management Training Program.	

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249.	Risk Matrix and Risk Assessment Tool	<p>Recommend using a risk matrix in mitigating risk in aircraft operations. A risk matrix can be used for almost any operation by assigning likelihood and severity. In the case presented, the pilot assigned a likelihood of occasional and the severity as catastrophic. As one can see, this falls in the high risk area. The following is a risk assessment tool presented in figure 17-5 of the Airplane Flying Handbook, FAA-H-8083-3A.</p> <div><div><div><div><div>Likelihood</div><div>Severity</div></div><table><tr><td></td><td>Catastrophic</td><td>Critical</td><td>Marginal</td><td>Negligible</td></tr><tr><td>Probable</td><td>High</td><td>High</td><td>Serious</td><td></td></tr><tr><td>Occasional</td><td>High</td><td>Serious</td><td></td><td></td></tr><tr><td>Remote</td><td>Serious</td><td>Medium</td><td></td><td>Low</td></tr><tr><td>Improbable</td><td></td><td></td><td></td><td></td></tr></table></div></div><div><div><div>Low Risk</div><div>Endangerment</div></div><div><div>0</div><div>Not Complex Flight</div><div>10</div><div>Exercise Caution</div><div>20</div><div>Area of Concern</div><div>30</div></div></div></div> <p>Source: FAA</p>		Catastrophic	Critical	Marginal	Negligible	Probable	High	High	Serious		Occasional	High	Serious			Remote	Serious	Medium		Low	Improbable					
	Catastrophic	Critical	Marginal	Negligible																								
Probable	High	High	Serious																									
Occasional	High	Serious																										
Remote	Serious	Medium		Low																								
Improbable																												
250.	AFM Addendums	Consider additions or restrictions to the AFM. Operational restrictions should be also addressed in the AFM.																										
251.	Training Guidance	Recommend the applicable USAF/RCAF/NATO training manuals and materials be used as an integral part of the operation of the aircraft.																										

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252.	USAF Phase Training	<p>Recommend SOPs and training incorporate the current USAF Phases of Training. These include—</p> <ul style="list-style-type: none"> Initial Qualification Training (IQT). This training is necessary to qualify aircrew for duties in the aircraft. Mission Qualification Training (MQT). This training is necessary to qualify aircrew for specific unit mission or local area requirements. Continuation Training (CT). This training is necessary for qualified aircrew to maintain their assigned level of proficiency and/or increase flight qualifications. It provides minimum ground and flight training event requirements. 	
253.	F-86 Flight Characteristics	Recommend PIC ready and study the following material regarding the flying and operational characteristics of the F-86 Sabre Jet. See F-86 Sabre – The Operational Record, Chapter 8 – Flying the Sabre Mk 4, The First Line – Air Defense in the Northeast 1952 to 1960, Chapters 1 – 9, F-86 Sabre Pilots Association, Sabre Jet Classics (Over 175 Magazine Articles by Title & Author). Larry Davis (editor), http://sabre-pilots.org/classics.htm .	
254.	Pilot Induced Oscillation PIO	SOPs and training should emphasize that at high IAS, the F-86's stick movement per G is very small, and there is a risk of PIO. In one accident, the aircraft began porpoising at 500 knots bent one wing and lost an elevator.	
255.	In-Flight Canopy Separation	Revise the pilot checklist to emphasize (that is, “warning—caution”) the proper closing of the canopy.	
256.	Slats, 6-3 Wing, and “Flying Tail”	SOPs and training should address the differences in handling caused by the slats, 6-3 wing, and the “flying tail.” Early models had automatic leading edge slats. Later versions had non-slatted leading edges, extended six inches at the root and three inches at the tip. Many older models were retrofitted with the new wings. The new wing improved high-speed performance, but raised the stall speed from 128 to 144 knots. Another controllability improvement made during the production period was changing the tail from a stabilizer and elevator to an all moving horizontal tail. The new tail eliminated loss of control sensitivity at high Mach numbers and reduced the possibility of flutter.	
257.	Fuel Mismanagement	Require special emphasis on fuel starvation and fuel management. Operator must be aware that the total fuel load and compare to the fuel indicators to determine accuracy.	
258.	Speed Limitations Due To Avionics and Other Equipment	Verify the speed limit of the aircraft is adjusted to address installed avionics, which may have speed limitations.	
259.	Brake and Steering System	Recommend an adequate check-out on the aircraft's brake and steering system has been given to anyone taking control of the aircraft on the ground.	
260.	Command Ejection	Ensure SOPs address the command ejection issue, that is, who ejects first, per the appropriate guidance (i.e., USAF, RCAF, NATO), before the flight if the back seat or rear seat is occupied.	
261.	Weight Limits for the Ejection Seats	If the ejection seat is active, procedures should ensure that for every flight, the weight of any occupant meets design requirements.	

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262.	Single-Engine Handling	If applicable, ensure SOPs emphasize single-engine emergencies and handling, including configuration changes.	
263.	AOA Indicator	Ensure SOPs emphasize the risk of high AOA operations and AOA usage in the landing configuration.	
264.	Air Start Procedures	Ensure SOPs emphasize the correct emphasizes on air start procedures. This has been the cause of several accidents involving former military high-performance aircraft.	
265.	Configuration Checks	Recommend SOPs and training focus on configuration checks.	
266.	Brake Application	Recommend SOPs and training focus on the proper application of braking action during landing.	
267.	Non-standardization of Attitude Indicators	Be aware and understand the particular attitude indicator in the F-86 being certificated. It was documented in USAF Fighter Interceptor squadrons that 4 different types were available and two of them actually gave opposite presentations, which could confuse a pilot flying in an emergency or adverse weather conditions. Note: A RAF pilot crashed because of unfamiliarity with the American-designed artificial horizon has the bank indicator on the top segment instead of the bottom segment as on the British artificial horizon.	
268.	Separating Stick Grips on Control Stick	Be aware of loose stick grips on the pilot's control stick. In January 1953, investigators reported the separation of the stick grip from the control column causing the pilot to fly in the ground. Inspections revealed 3 other incidents of separated stick grips and 4 loosened grips. The USAF noted that in January 1952, there were a dozen undetermined fatal accidents that might have been caused by this problem.	
269.	Oxygen Check	Recommend SOPs and training require the pilot to perform the "PRICE" check on the oxygen equipment (PRESSURE, REGULATOR, INDICATOR, CONNECTIONS and EMERGENCY) before every flight if a pressure oxygen system is installed. The acronym PRICE is a checklist memory-jogger that helps pilots and crewmembers inspect oxygen equipment. Mix and match components with caution. When interchanging oxygen systems components, ensure compatibility of the components storage containers, regulators, and masks. This is a particularly important issue because the age of the aircraft may require the use of modern equipment, at least for some components.	
270.	Spool Down Time	Ensure SOPs incorporate noting the spool down time of the engine after shutdown. This is critical, as it could indicate an upcoming problem with the engine.	
271.	End of Runway (EOR) Check	Recommend SOPs and training emphasize the importance of an EOR check.	
272.	Specific Range	Recommend SOPs address minimum landing fuel. Verify actual aircraft-specific range (nautical air miles traveled per pound of fuel used). See <i>Performance Planning</i> below.	
273.	Performance Planning	Ensure use of proper performance charts, typically found in the -1-1 manual in late USAF F-86 guidance. Note: Changing an airframe from the slatted to the "hard" wings, from a performance standpoint, is critical.	
274.	Bingo and Minimum Landing Fuel	Recommend establishing SOPs addressing minimum landing fuel for IFR operations as provided in § 91.151, Fuel Requirements for Flight in VFR Conditions, in addition to § 91.167, to add a level of safety. In addition, a "Bingo" fuel status (a pre-briefed amount of fuel for an aircraft that would allow a safe return to the base of intended landing) should be used in all flights. Note: Bingo fuel and minimum landing fuel are not necessarily the same, in that a call for Bingo fuel and a return to base still require managing the minimum landing fuel. See <i>Fuel Quantity Indicators</i> below.	

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275.	Fuel Quantity Indicators and External Fuel Tanks	Recommend SOPs to introduce conservative flight times as a common practice. Indicators are measured in pounds and do not indicate what is left in the external fuel tanks (if installed). An operator noted that "if drop tanks are installed, it is recommended to check that the drop pressure shutoff valve "ON" at all times to ensure drop tank fuel is consumed. Also, recommend a personal minimum such as "70 gallons in the fuselage tank at the break" for example.	
276.	Fuel Transfer & Fuel Burn Sequence	Recommend SOPs and training to address fuel management in the F-86. Read the various "Note(s)" in the F-86 aircraft and variants for fuel starvation and afterburner operations for an overall understanding of aircraft's fuel system. Emphasize the need to adhere to fuel burn sequences for the different configurations (W&B issue).	
277.	Suspected Flight Control Failure	Recommend establishing SOPs for troubleshooting suspected in-flight control failures, that is, specific checklist procedures, altitude, and clear location. This is very important due to the aircrafts' history of flight control problems.	
278.	Over Rotation, Flap Retraction and Trim Change	SOPs and training should emphasize these concerns. Over rotation is a common F-86 accident cause, including the notorious 1972 Sacramento accident where a civilian F-86 crashed during take-off killing 22. "The National Transportation Safety Board concluded that the cause of the crash was that the pilot tried to lift off too quickly, in an action known as over-rotation, pointing the nose of the jet three times higher than the normal angle because he mistakenly used misleading visual cues due to a lack of experience in this type of aircraft. Instead of becoming airborne sooner, the plane never left the ground, and continued down the runway at 125 knots. It was also determined that proximity of buildings, trees, and other obstacles, in conjunction with the short length of Runway 30, could have contributed to the pilot's desire to pitch-to-climb earlier and more aggressively than required. The Safety Board also noted that, if not for the air show, the pilot and aircraft would not have been at the Sacramento Airport to begin with, due to the limitations on both." http://www.check-six.com/Crash_Sites/Sabrejet_crash_site.htm	
279.	Rejected Takeoff	Recommend SOPs and training address the abort decision.	
280.	Rapid Throttle Movement	Recommend SOPs and training address rapid throttle movement (pilot induced), which can cause flameouts. Engine failure was the greatest cause of F-86 accidents, accounting for 15% of the major accidents. An engine flame-out could even be more pronounced with the emergency fuel regulator was left "on". It could, along with rapid throttle movement, call for too much fuel and cause a flame-out.	

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281.	Engine Fire Warning System	<p>Recommend SOPs and training address the engine fire warning system. Since the F-86 does not have an engine fire extinguishing system, proper precautions must be taken when the "Fire-Warning" light flashes. As a reference, the following was included in USAF F-86 guidance:</p> <ol style="list-style-type: none"> 1. Turn away from the sun or in a different direction to see if sunlight is reflecting on the actual light. 2. If flying formation, have other aircraft check and verify if aircraft is on fire. 3. If flying single ship, proper judgment must be made since there could be a matter of seconds once the fire-warning light comes on that the aircraft may blow up in flight. <p>This excerpt from a NTSB F-86 accident report which occurred in 2002 illustrates the importance of a the engine fire warning system: "On November 4, 2002, at 0850 eastern standard time, a Canadair F-86 airplane, N30CJ, was destroyed upon impact with terrain during a forced landing following a loss of engine thrust during initial takeoff climb from the San Isidro Air Force Base, in the Dominican Republic. The airline transport rated pilot, sole occupant of the Korean War vintage aircraft, was fatally injured. The aircraft was owned and operated by the pilot. Visual meteorological conditions prevailed for the international cross country flight for which a visual flight rules (VFR) flight plan was filed. The flight was originating from the Dominican Air Force Base at the time of the mishap. The flight's intended destination was Ocala, Florida, with an intermediate refueling stop planned for Nassau, Bahamas. According to his wingman and witnesses, the airplane was in a slight climb attitude, wings level, at an estimated airspeed of 250 knots, when a "large ball of fire" was observed coming from the aircraft tailpipe. The pilot reported losing engine power and simultaneously initiated a left turn back towards the military airbase. The pilot established a glide and managed to maneuver the airplane away from populated areas, towards and open field. The airplane touched down in controlled flight on a marshy area. During the landing slide, one of the wings was reported to have collided with the remains of a partly covered abandoned truck, resulting in a post-impact fire."</p>	
282.	Generator-reset Switch	In the event of an aircraft electrical failure, be familiar with the proper operation of the generator-reset switch. An aircraft in the RAF experienced a total electrical failure and pilot was unfamiliar with the proper operation of the generator-reset switch and needed to make emergency belly landing at a near-by airfield.	
283.	FAA AC 91-79	Recommend the use of AC 91-79, Runway Overrun Prevention. According to AC 91-79, safe landings begin long before touchdown. Adhering to SOPs and best practices for stabilized approaches will always be the first line of defense in preventing a runway overrun.	
284.	FAA AC 61-107	Recommend the use of AC 61-107, Operations of Aircraft at Altitudes Above 25,000 ft MSL and/or Mach Numbers (MMO) Greater Than 0.75. This AC can be used to assist pilots who are transitioning from aircraft with less performance capability to complex, high-performance aircraft that are capable of operating at high altitudes and high airspeeds. It also provides knowledge about the special physiological and aerodynamic considerations involved in these kinds of operations.	
285.	360-Degree Overhead Pattern Technique	Recommend the operator consider implementing SOPs to refrain from 360-degree overhead patterns. There is no civil application of this technique.	
286.	Crosswinds	Recommend the operator consider implementing SOPs that refer to conservative crosswind limitations (possibly more conservative than those in the AFM) and adhere to the appropriate crosswind landing techniques.	
287.	Outdoors	Recommend establishing SOPs to address the aircraft's sensitivities to weather, including hydraulic seal failures and leakages, freezing moisture, transparencies, air intake, and exhaust protection if necessary.	

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288.	Reporting Malfunctions and Defects	Ask the applicant/operator to report incidents, malfunctions, and equipment defects found in maintenance, preflight, flight, and post-flight inspection. This would yield significant safety benefits to operators and the FAA. A 2011 study for the U.S. Navy points to the effectiveness of such practices. It stated: "The data analysis carried out was a comprehensive attempt to examine the strength of the link between safety climate and mishap probability. Our findings would seem to support the premise that safety climate and safety performance are, at best, weakly related. Mishaps are rare events, and they describe only part of the spectrum of risks pertaining to a work system. We suggest that measuring workers' self-reported safety attitudes and behavior is an alternative way to assess the discriminate validity of safety climate." O'Connor, October 2011. In other words, reporting safety issues, such as malfunctions, goes a long way in preventing an accident.	
289.	Cockpit Familiarization	Recommend detailed and comprehensive SOPs/training (not unlike the military-style training known as "blindfold cockpit check with boldface items" conducted in a cockpit or cockpit simulator) be instituted to ensure adequate cockpit familiarization for the PIC.	
290.	Simulated Emergencies	Permit simulated emergencies only in accordance with the applicable AFM, including emergency and abnormal checklists and in accordance with the limitations issued by the FAA for the aircraft.	
291.	High-G Training	Recommend the PIC and any occupants received training, including techniques to mitigate the potential effects of high-G exposure if operations above 3 Gs are contemplated.	
292.	Medical Fitness for Ejection Seats	Recommend the applicant/operator consider aircrew medical fitness as part of flight qualifications and preparation. In addition to meeting any ejection seat limitations (that is, weight and height) and seat-specific training, relevant U.S. military medical fitness standards could be used to ensure survival after ejection is maximized and injuries minimized. Ejection records show that when survivable, many ejections inflict serious injuries. Examples of aeromedical guidance include AFI 48-123, Medical Examinations and Standards, dated May 22, 2001, and Army Regulation 40-501, Standards of Medical Fitness, dated June 14, 1989. Also refer to Defense and Civil Institute of Environmental Medicine, Department of National Defense, Canada. <i>Ejection Systems and the Human Factors: A Guide for Flight Surgeons and Aeromedical Trainers</i> , May 1988.	
293.	49 CFR Part 830	Ask the applicant/operator to adopt open and transparent SOPs that promote the use and requirements of 49 CFR § 830, Notification And Reporting Of Aircraft Accidents or Incidents and Preservation of Aircraft Wreckage, Mail, Cargo, and Records, because there have been many instances where accidents and incidents are not reported, hindering safety. Occurrences, which are events other than an accident or incident (that requires investigation by the Flight Standards Service for its potential impact on safety) should also be reported. Occurrences include the following when no injury, damage, or § 830.5 reporting requirements are involved: (1) aborted takeoffs not involving a runway excursion, (2) air turn-backs where the aircraft returns to the departure airport and lands without incident, and (3) air diversions where the aircraft diverts to a different destination for reasons other than weather conditions. Reference should be made of FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting.	
294.	NATO Aviation Safety Guidance	Recommend the relevant sections of <i>Aviation Safety</i> AFSP-1(A), NATO, March 2007, be incorporated into the appropriate operational aspects of the operations to enhance overall safety. This document, which incorporates many safety issues concerning the safe operation of combat aircraft, sets out aviation safety principles, policies, and procedures—in particular those aimed at accident prevention. This document is a basic reference for everybody involved in aviation safety, both in occurrence prevention (starting from the development, testing, and introduction of material and procedures) and in its aftermath (the determination of the causes of an occurrence and the implementation of measures to prevent its recurrence). It is also recommended this process include internal safety audits. Safety audits help identify hazards and measure compliance with safety rules and standards. They assist in determining the adequate condition of work areas, adherence to safe work practices, and overall compliance with safety-based and risk-reduction procedures.	
295.	USAF AFI 91-202	Recommend the incorporation of USAF AFI 91-202, <i>The Mishap Prevention Program</i> , August 5, 2011, as part of the operation of the aircraft.	

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296.	USAF AFI 11-218	Recommend the incorporation of USAF AFI 11-218, <i>Aircraft Operations, and Movement on the Ground</i> , October 28, 2011, Change 1, November 1, 2012, as part of the operation of the aircraft.	
297.	Aircrew Records	Recommend the applicant/operator establish and maintain processes to address aircrew qualifications and records. This could include pilot certification, competency, ground and flight training (records, instructors, conversion training, command training, and proficiency), medical, duty time, and flight time records.	
298.	Type Clubs or Organizations	Recommend the applicant/operator join a type club or organization. This facilitates safety information collection and dissemination.	
299.	National Warbird Operator Conference (NWOC)	Recommend the F-86 applicant/operator participate at the National Warbird Operator Conference. Founded in 1993, "the annual NWOC event brings together warbird owners, operators, and museum directors to address particular events facing warbird owners and to discuss common goals related to the ever-changing economics, operations, and regulations pertaining to flying ex-military aircraft. NWOC focuses on the exchange of ideas and information concerning the safe operation and restoration of warbird aircraft. This unique educational conference offers programs to enhance pilot skill and knowledge, expand aircraft maintenance technician and restorer knowledge, develop awareness of medical and insurance facts, and address aircraft-specific topics to ensure continued flight for these unique historic aircraft." http://www.warbirdconference.com/ .	
300.	Insurance	It is recommended that the applicant/operator acquire the adequate type of insurance coverage. This is, and continues to be, an issue for many operators. However, the important role of insurance as part of an overall safety culture should not be underestimated. For example, EAA's Warbirds of America's insurance program "emphasizes <i>SAFETY</i> , utilizing various training syllabuses and safety forums," and includes "discounts available for participation in approved ground and flight safety programs." The adequate type of insurance coverage will greatly contribute to the safe operation of the aircraft because it involves an additional level of safety oversight that complements both the operator's and the FAA's.	
301.	TSA Publication A-001	Recommend that operator become familiar with the Transportation Security Administration's (TSA) <i>Security Guidelines for General Aviation Airports</i> , Information Publication A-001, May 2004. This guidance document was developed by TSA, in cooperation with the General Aviation (GA) community. It is intended to provide GA airport owners, operators, and users with guidelines and recommendations that address aviation security concepts, technology, and enhancements. The recommendations contained in this document have been developed in close coordination with a Working Group comprised of individuals representing the entire spectrum of the GA industry. This material should be considered a living document which will be updated and modified as new security enhancements are developed and as input from the industry is received. To facilitate this, TSA has established a mailbox to collect feedback from interested parties. Persons wishing to provide input should send Email to General.Aviation@dhs.gov and insert "GA Airport Security" in the subject line.	
302.	Emergency Planning and Preparedness	Recommend the applicant/operator institute emergency plans and post-accident management SOPs that ensure the consequences of major incidents and accidents to aircraft are dealt with promptly and effectively.	

Attachment 4 - Additional Resources and References

Additional Resources

- Accident data (F-86) issued by the NTSB in the United States or other foreign investigative agencies.
- USAF F-86 Aircraft Accident Summary reports.
- Australia's CAAP 30-3(0), *Approved Maintenance Organization (AMO) - Limited Category Aircraft*, Civil Aviation Advisory Publication, December 2001. This publication addresses the restoration and maintenance of ex-military aircraft and is an excellent guide for developing adequate aircraft maintenance and inspection programs.
- CAP 632, *Operation of Permit to Fly Ex-Military Aircraft on the UK Register*. This is a comprehensive source of information and guidance on topics like technical requirements, specialist equipment and systems, pilot/crew qualification, operational requirements, records and oversight procedure, and safety management.
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 Australia Warbirds Association, Ltd.
 Experimental Aircraft Association (EAA).
 Flight Safety Foundation.
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 Naval Safety Center.
 Portuguese Air Force.
 Royal Canadian Air Force.
 San Diego Air & Space Museum.

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Attachment 5 - Partial Listing of F-86 Accidents and Relevant Incidents

	Date	Version	Operator	Severity	Probable Cause & Remarks
1.	July 24, 2006	Canadair F-86	N86FS	Fatal (1)	Improper Weight & Balance – Crashed on Take-off
2.	November 4, 2002	Canadair F-86	N30CJ	Fatal (1)	Engine Fire
3.	June 19, 1999	Canadair F-86	N186JC	Fatal (1)	Fuel System Transfer – Fuel Starvation (Airshow)
4.	April 1999	F-86F	N186CJ	Non-Fatal	Engine Flame-Out (Fuel Starvation) (AND)
5.	June 1, 1997	F-86E	N86EX	Fatal (1)	LOC (Airshow)
6.	May 2, 1993	F-86E	N3842J	Fatal (1)	LOC (Airshow)
7.	June 5, 1990	F-86E	N93FS	Non-Fatal	Unknown
8.	April 25, 1987	F-86F	N86Z	Fatal	Engine Seized (During Airshow)
9.	April 11, 1977	F-86F	JASDF	Fatal (1)	Possible LOC During ACM
10.	March 23, 1976	F-86	N8544	Non-Fatal	LOC - Winds Gusting to 25 Knots
11.	July 8, 1974	F-86F	JASDF	Fatal	Unknown
12.	1972	F-86F	N275X	Fatal (22)	Failure to Get Airborne - Overrun
13.	January 9, 1968	F-86F	German AF	Non-Fatal	Engine Lost Power (Approach)
14.	August 28, 1967	F-86K	Italian AF	Fatal	Unknown
15.	August 26, 1967	F-86F	German AF	Unknown	Unknown
16.	July 14, 1966	F-86F	German AF	Unknown	Unknown
17.	July 14, 1966	F-86F	German AF	Non-Fatal	Unknown
18.	April 14, 1966	F-86F	German AF	Unknown	Unknown
19.	February 14, 1966	F-86F	German AF	Non-Fatal	Engine Failure (Icing conditions)
20.	September 23, 1965	F-86F	German AF	Fatal	Engine Fire (Take-off)
21.	September 21, 1965	F-86F	German AF	Non-Fatal	Unknown
22.	July 13, 1965	F-86K	German AF	Unknown	Unknown
23.	June 29, 1965	F-86F	German AF	Non-Fatal	Engine Flame-out
24.	May 18, 1965	F-86F	German AF	Non-Fatal	Engine Failure
25.	November 27, 1964	F-86F	German AF	Fatal	Unknown
26.	November 24, 1964	F-86K	German AF	Non-Fatal	Unknown
27.	September 3, 1964	F-86F	German AF	Fatal	Unknown (On Approach)
28.	August 27, 1964	F-86F	German AF	Non-Fatal	Unknown (Landing Gear Problems)
29.	August 5, 1964	F-86F	German AF	Non-Fatal	LOC
30.	July 16, 1964	F-86F	German AF	Non-Fatal	Unknown
31.	July 8, 1964	F-86F	German AF	Non-Fatal	Engine Flame-out
32.	July 7, 1964	F-86F	German AF	Non-Fatal	Hydraulic Problems
33.	June 18, 1964	F-86F	German AF	Unknown	Unknown
34.	June 7, 1964	F-86F	Columbia AF	Unknown	Unknown
35.	April 7, 1964	F-86F	German AF	Fatal	Unknown
36.	March 19, 1964	F-86F	German AF	Non-Fatal	Engine Failed
37.	February 18, 1964	F-86F	Royal Norwegian AF	Fatal	Wings Detached from Aircraft after Dive
38.	January 2, 1964	F-86K	Royal Netherlands AF	Unknown	Unknown
39.	December 5, 1963	F-86F	German AF	Non-Fatal	Unknown

40.	October 30, 1963	F-86K	German AF	Non-Fatal	Unknown
41.	August 23, 1963	F-86F	German AF	Non-Fatal	Fuel Exhaustion (Bad Weather)
42.	August 7, 1963	F-86F	German AF	Fatal	Unknown
43.	July 24, 1963	F-86K	Royal Netherlands AF	Non-Fatal	Fuel Exhaustion
44.	July 1, 1963	F-86K	Royal Netherlands AF	Unknown	Unknown
45.	May 6, 1963	F-86K	Royal Netherlands AF	Non-Fatal	Mid-Air Collision
46.	May 6, 1963	F-86K	Royal Netherlands AF	Non-Fatal	Mid-Air Collision
47.	April 22, 1963	F-86F	German AF	Non-Fatal	Engine Problems
48.	September 24, 1962	F-86F	Royal Norwegian AF	Unknown	Unknown
49.	September 20, 1962	F-86F	German AF	Non-Fatal	Engine Flame-out
50.	June 13, 1962	F-86F	German AF	Fatal	Unknown
51.	June 12, 1962	F-86F	German AF	Non-Fatal	Unknown (Aborted Take-off)
52.	May 15, 1962	F-86F	German AF	Fatal	Unknown
53.	May 3, 1962	F-86K	German AF	Fatal	Mid-Air Collision
54.	May 3, 1962	F-86K	German AF	Fatal	Mid-Air Collision
55.	February 18, 1962	SF-86F	Royal Norwegian AF	Unknown	Unknown
56.	January 10, 1962	F-86K	Royal Netherlands AF	Unknown	Unknown
57.	August 9, 1961	F-86F	German AF	Non-Fatal	Mid-Air Collision
58.	August 9, 1961	F-86F	German AF	Fatal	Mid-Air Collision
59.	August 9, 1961	F-86F	German AF	Non-Fatal	Mid-Air Collision
60.	July 29, 1961	F-86D	Greek AF	Fatal	Unknown
61.	June 26, 1961	F-86F	German AF	Non-Fatal	Unknown (Take-off)
62.	June 6, 1961	CL-13 Sabre 6	Colombia AF	Unknown	Unknown
63.	May 9, 1961	F-86F	German AF	Non-Fatal	Mid-Air Collision
64.	May 9, 1961	F-86F	German AF	Non-Fatal	Mid-Air Collision
65.	April 20, 1961	F-86F	Royal Norwegian AF	Fatal	Wings Detached from Aircraft after Dive
66.	April 12, 1961	F-86F	German AF	Non-Fatal	Compressor Stall
67.	March 16, 1961	F-86K	Royal Netherlands AF	Unknown	Unknown
68.	February 25, 1961	F-86K	Royal Netherlands AF	Non-Fatal	Mid-Air Collision
69.	January 17, 1961	SF-86F	Royal Norwegian AF	Fatal	Unknown (Crashed into Mountain)
70.	January 12, 1961	F-86F	German AF	Fatal	Mid-Air Collision
71.	January 12, 1961	F-86F	German AF	Non-Fatal	Mid-Air Collision
72.	December 7, 1960	F-86F	German AF	Non-Fatal	Engine Fire
73.	October 18, 1960	F-86F	German AF	Fatal	Mid-Air Collision
74.	October 18, 1960	F-86F	German AF	Non-Fatal	Mid-Air Collision
75.	October 14, 1960	F-86K	Royal Netherlands AF	Non-Fatal	Unknown
76.	September 15, 1960	F-86F	German AF	Fatal	Unknown
77.	August 26, 1960	F-86F	German AF	Fatal	Unknown
78.	August 1, 1960	F-86F	Royal Norwegian AF	Non-Fatal	Mid-Air Collision
79.	June 22, 1960	CL-13 Sabre 6	Colombia AF	Unknown	Unknown
80.	June 13, 1960	F-86F	German AF	Fatal	Unknown
81.	June 8, 1960	F-86F	German AF	Unknown	Unknown
82.	February 24, 1960	F-86K	Italian AF	Unknown	Unknown

83.	January 28, 1960	F-86K	Royal Netherlands AF	Fatal	Unknown
84.	1960	F-86F	Portuguese AF	Non-Fatal	Gear-Up Landing (Mechanical)
85.	August 5, 1959	F-86F	Royal Norwegian AF	Fatal	Unknown (Aircraft Hit Mountain)
86.	July 29, 1959	F-86K	Italian AF	Fatal	Unknown
87.	July 13, 1959	F-86F	German AF	Fatal	Hit Trees on Landing Approach
88.	May 25, 1959	F-86F	German AF	Fatal	Unknown (Exploded in Flight)
89.	May 11, 1959	F-86F	German AF	Unknown	Unknown
90.	May 10, 1959	F-86F	German AF	Unknown	Unknown
91.	January 2, 1959	F-86K	Royal Netherlands AF	Unknown	Unknown
92.	November 14, 1958	F-86F	Royal Norwegian AF	Fatal	Unknown
93.	November 7, 1958	F-86F	German AF	Unknown	Unknown
94.	November 4, 1958	F-86F	Royal Norwegian AF	Fatal	Unknown
95.	October 24, 1958	F-86F	German AF	Unknown	Unknown
96.	October 22, 1958	F-86E	Italian AF	Non-Fatal	Mid-Air Collision
97.	September 26, 1958	F-86F	German AF	Non-Fatal	Pilot Loss of Situational Awareness (Hit Trees on Gunnery Range)
98.	August 21, 1958	F-86K	Royal Netherlands AF	Non-Fatal	Fuel Exhaustion (Pilot Lost)
99.	May 19, 1958	F-86F	German AF	Non-Fatal	Aborted Take-off
100.	January 29, 1958	F-86K	Royal Netherlands AF	Unknown	Unknown
101.	January 9, 1957	F-86F	JASDF	Unknown	Mid-Air Collision
102.	January 9, 1957	F-86F	JASDF	Fatal	Mid-Air Collision
103.	September 4, 1956	F-86A-5	USAF	Unknown	Mid-Air Collision
104.	July 13, 1956	F-86K	Royal Netherlands AF	Non-Fatal	Unknown
105.	June 29, 1956	F-86K	Royal Netherlands AF	Non-Fatal	Landed Short of Runway
106.	March 17, 1956	F-86A-5	USAF	Unknown	Mid-Air Collision
107.	January 25, 1956	Sabre F4	RAF	Non-Fatal	Engine Failure
108.	December 12, 1955	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
109.	November 22, 1955	F-86F-30	USAF	Fatal	Unknown (Landing Accident)
110.	November 20, 1955	RF-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
111.	November 6, 1955	F-86A-5	USAF	Fatal	Unknown (Ground Collision)
112.	October 21, 1955	F-86F-30	USAF	Non-Fatal	Engine Failure
113.	October 10, 1955	F-86F-30	USAF	Non-Fatal	Unknown (Aircraft Fire)
114.	September 10, 1955	F-86A-5	USAF	Fatal	Unknown (Take-off)
115.	September 2, 1955	Sabre F4	RAF	Fatal	Fuel Starvation
116.	September 1, 1955	F-86F-30	USAF	Non-Fatal	Engine Failure
117.	August 25, 1955	F-86F-35	USAF	Non-Fatal	Engine Failure (Out of Fuel)
118.	August 17, 1955	Sabre F4	RAF	Fatal	Mid-Air Collision
119.	August 16, 1955	Sabre F4	RAF	Fatal	LOC/High-Speed Stall
120.	August 8, 1955	F-86F-30	USAF	Fatal	Unknown
121.	August 6, 1955	F-86A-5	USAF	Non-Fatal	Unknown (Mechanical Failure)
122.	August 3, 1955	Sabre F4	RAF	Fatal	LOC/High-Speed Stall
123.	July 23, 1955	F-86F-35	USAF	Fatal	Unknown
124.	July 21, 1955	F-86F-25	USAF	Non-Fatal	Engine Failure
125.	July 15, 1955	Sabre F4	RAF	Fatal	LOC/Landing

126.	July 12, 1955	Sabre F4	RAF	Non-Fatal	LOC/Landing
127.	July 5, 1955	Sabre F4	RAF	Fatal	Engine Failure/Fire
128.	July 4, 1955	F-86F-30	USAF	Non-Fatal	Engine Failure
129.	June 26, 1955	Sabre F4	RAF	Non-Fatal	Pilot Error
130.	June 24, 1955	Sabre F4	RAF	Non-Fatal	Over Rotation
131.	June 16, 1955	Sabre F4	RAF	Fatal	In-Flight Break Up
132.	May 23, 1955	F-86F-1	USAF	Fatal	Unknown
133.	May 16, 1955	Sabre F4	RAF	Fatal	LOC
134.	May 14, 1955	Sabre F4	RAF	Non-Fatal	LOC/Landing
135.	May 3, 1955	Sabre F4	RAF	Non-Fatal	Fuel Starvation – Fuel System Failure
136.	April 8, 1955	F-86F-30	USAF	Non-Fatal	Unknown (Mechanical Failure)
137.	April 6, 1955	Sabre F4	RAF	Non-Fatal	Over Rotation
138.	April 5, 1955	Sabre F4	RAF	Fatal	Mid-Air Collision
139.	March 16, 1955	Sabre F4	RAF	Fatal	LOC/Landing
140.	March 13, 1955	F-86A-5	USAF	Unknown	Unknown
141.	March 7, 1955	F-86F-30	USAF	Non-Fatal	Unknown (Mechanical Failure)
142.	February 24, 1955	Sabre F4	RAF	Non-Fatal	LOC/Take-off
143.	February 24, 1955	F-86F-30	USAF	Non-Fatal	Unknown (Mechanical Failure)
144.	February 10, 1955	Sabre F4	RAF	Fatal	LOC
145.	February 4, 1955	F-86F-30	USAF	Fatal	Mid-Air Collision
146.	February 4, 1955	Sabre F4	RAF	Fatal	LOC/Flight Controls Jammed
147.	January 29, 1955	Sabre F4	RAF	Non-Fatal	Pilot Error
148.	January 9, 1955	F-86F-30	USAF	Fatal	Unknown (Ground Collision)
149.	January 9, 1955	F-86F-30	USAF	Fatal	Unknown (Ground Collision)
150.	November 29, 1954	Sabre F4	RAF	Non-Fatal	Engine Failure
151.	November 24, 1954	Sabre F4	RAF	Non-Fatal	LOC/Take-Off
152.	October 29, 1954	Sabre F4	RAF	Non-Fatal	Engine Failure
153.	October 29, 1954	Sabre F4	RAF	Non-Fatal	In-Flight Break Up
154.	October 26, 1954	Sabre F4	RAF	Non-Fatal	Mid-Air Collision
155.	October 26, 1954	Sabre F4	RAF	Non-Fatal	Mid-Air Collision
156.	October 23, 1954	Sabre F4	RAF	Fatal	LOC
157.	October 19, 1954	Sabre F4	RAF	Fatal	In-Flight Fire
158.	October 8, 1954	F-86F-30	USAF	Non-Fatal	Mid-Air Collision
159.	October 8, 1954	Sabre F4	RAF	Fatal	LOC/High G Black-Out
160.	October 3, 1954	F-86A-5	USAF	Non-Fatal	Engine Failure
161.	September 29, 1954	Sabre F4	RAF	Fatal	Engine Failure
162.	September 22, 1954	Sabre F4	RAF	Non-Fatal	Pilot Error
163.	September 21, 1954	Sabre F4	RAF	Fatal	LOC
164.	September 9, 1954	F-86F-30	USAF	Non-Fatal	Unknown (Ground Collision)
165.	September 7, 1954	Sabre F4	RAF	Non-Fatal	Fuel Starvation
166.	September 5, 1954	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
167.	September 2, 1954	Sabre F4	RAF	Non-Fatal	Landing Gear Failure
168.	August 27, 1954	Sabre F4	RAF	Non-Fatal	Fuselage Fire – Heat Control Failure

169.	August 23, 1954	F-86A-5	USAF	Fatal	Unknown (Ground Collision)
170.	August 23, 1954	F-86F-25	USAF	Fatal	Unknown
171.	August 10, 1954	Sabre F4	RAF	Non-Fatal	Fuel Starvation
172.	August 5, 1954	Sabre F4	RAF	Non-Fatal	Overrun
173.	July 23, 1954	Sabre F4	RAF	Fatal	LOC/Engine Failure
174.	July 22, 1954	Sabre F4	RAF	Fatal	CFIT
175.	July 22, 1954	Sabre F4	RAF	Fatal	CFIT
176.	July 22, 1954	Sabre F4	RAF	Non-Fatal	Anoxia
177.	July 20, 1954	F-86F-20	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
178.	July 17, 1954	F-86E-1	USAF	Non-Fatal	Unknown (Structural Failure)
179.	July 10, 1954	F-86F-30	USAF	Non-Fatal	Engine Failure
180.	July 8, 1954	Sabre F4	RAF	Fatal	LOC
181.	July 7, 1954	F-86F-30	USAF	Fatal	Mid-Air Collision
182.	July 7, 1954	F-86F-30	USAF	Fatal	Mid-Air Collision
183.	June 29, 1954	Sabre F4	RAF	Non-Fatal	Engine Failure (Fuel Leak)
184.	June 28, 1954	F-86F-30	USAF	Non-Fatal	Unknown (Take-off Accident)
185.	June 26, 1954	F-86E-10	USAF	Fatal	Unknown (Ground Collision)
186.	June 22, 1954	Sabre F4	RAF	Non-Fatal	Fuel Starvation
187.	June 16, 1954	Sabre F4	RAF	Non-Fatal	Electrical Failure
188.	June 16, 1954	Sabre F4	RAF	Non-Fatal	Mid-Air Collision
189.	June 16, 1954	Sabre F4	RAF	Non-Fatal	Mid-Air Collision
190.	June 14, 1954	F-86F-30	USAF	Fatal	LOC
191.	June 7, 1954	F-86F-5	USAF	Non-Fatal	Mid-Air Collision
192.	June 7, 1954	F-86F-30	USAF	Non-Fatal	Mid-Air Collision
193.	June 3, 1954	Sabre F4	RAF	Non-Fatal	Tire Burst
194.	June 1, 1954	F-86F-30	USAF	Fatal	Unknown (Ground Collision)
195.	May 28, 1954	F-86F-30	USAF	Non-Fatal	Unknown (Take-off Accident)
196.	May 19, 1954	F-86E-15	USAF	Fatal	Unknown (Structural Failure)
197.	May 13, 1954	Sabre F4	RAF	Non-Fatal	Engine Failure
198.	May 5, 1954	F-86F-30	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
199.	April 28, 1954	F-86F-30	USAF	Fatal	Engine Failure
200.	April 26, 1954	F-86F-30	USAF	Non-Fatal	Engine Failure (Out of Gas)
201.	April 25, 1954	F-86F-35	USAF	Non-Fatal	Unknown (Ground Collision)
202.	April 23, 1954	F-86F-25	USAF	Fatal	Engine Failure (Take-off)
203.	April 19, 1954	F-86F-25	USAF	Non-Fatal	Mid-Air Collision
204.	March 24, 1954	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
205.	March 24, 1954	F-86F-30	USAF	Non-Fatal	Mid-Air Collision
206.	March 22, 1954	F-86F-30	USAF	Non-Fatal	Unknown (Mechanical Failure)
207.	March 22, 1954	Sabre F4	RAF	Non-Fatal	Electrical Failure
208.	March 8, 1954	F-86F-30	USAF	Non-Fatal	Engine Failure
209.	March 8, 1954	F-86F-30	USAF	Non-Fatal	Engine Failure
210.	March 4, 1954	Sabre F4	RAF	Non-Fatal	Over Rotation
211.	March 3, 1954	Sabre F4	RAF	Non-Fatal	Engine Failure

212.	March 2, 1954	F-86F-30	USAF	Non-Fatal	Unknown
213.	March 2, 1954	Sabre F4	RCAF	Non-Fatal	Fuel Starvation
214.	March 2, 1954	Sabre F4	RCAF	Non-Fatal	Fuel Starvation
215.	February 24, 1954	Sabre F4	RAF	Fatal	Anoxia
216.	February 24, 1954	Sabre F4	RAF	Fatal	CFIT
217.	February 24, 1954	Sabre F4	RAF	Fatal	CFIT
218.	February 17, 1954	F-86E-6	USAF	Fatal	Unknown (Structural Failure)
219.	February 10, 1954	Sabre F4	RAF	Non-Fatal	Overrun
220.	January 28, 1954	F-86F-30	USAF	Non-Fatal	LOC
221.	January 4, 1954	F-86F-30	USAF	Fatal	Unknown
222.	December 28, 1953	Sabre F4	RCAF	Non-Fatal	Engine Failure
223.	December 27, 1953	F-86F-10	USAF	Non-Fatal	Mid-Air Collision
224.	December 27, 1953	F-86F-30	USAF	Non-Fatal	Mid-Air Collision
225.	December 24, 1953	F-86F	USAF	Fatal	Unknown
226.	December 16, 1953	F-86F-30	USAF	Non-Fatal	Engine Failure
227.	December 4, 1953	F-86F-5	USAF	Non-Fatal	Unknown (Landing Accident)
228.	November 6, 1953	Sabre F4	RAF	Non-Fatal	Mid-Air Collision
229.	November 6, 1953	Sabre F4	RAF	Fatal	Mid-Air Collision
230.	October 21, 1953	F-86A-1	USAF	Non-Fatal	Unknown (Landing Accident)
231.	October 8, 1953	F-86F-30	USAF	Non-Fatal	Taxi Accident
232.	October 8, 1953	F-86F-30	USAF	Non-Fatal	Taxi Accident
233.	September 26, 1953	F-86F-25	USAF	Non-Fatal	Unknown (Landing Accident)
234.	September 17, 1953	Sabre F4	RAF	Non-Fatal	Pilot Error
235.	September 5, 1953	F-86F-30	USAF	Fatal	LOC
236.	August 18, 1953	Sabre F4	RAF	Non-Fatal	Stabilizer Failure
237.	July 27, 1953	F-86E-5	USAF	Non-Fatal	Engine Failure
238.	July 26, 1953	F-86E-10	USAF	Non-Fatal	Unknown (Take-off Accident)
239.	July 24, 1953	F-86E-10	USAF	Non-Fatal	Unknown (Take-off Accident)
240.	July 18, 1953	Sabre F4	RCAF	Non-Fatal	Landing Gear Door Failure
241.	July 16, 1953	F-86E-10	USAF	Non-Fatal	Unknown (Landing Accident)
242.	July 15, 1953	F-86F-30	USAF	Non-Fatal	Taxi Accident
243.	July 14, 1953	F-86A-5	USAF	Unknown	Unknown
244.	July 12, 1953	F-86E-10	USAF	Non-Fatal	Mid-Air Collision
245.	July 1, 1953	F-86A-5	USAF	Non-Fatal	Unknown
246.	June 30, 1953	F-86A-5	USAF	Unknown	Unknown
247.	June 30, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Take-off Accident)
248.	June 27, 1953	F-86F-30	USAF	Non-Fatal	Engine Failure (Take-off Accident)
249.	June 25, 1953	F-86F-30	USAF	Fatal	Engine Failure (Take-off Accident)
250.	June 24, 1953	F-86E-5	USAF	Non-Fatal	Unknown (Take-off Accident)
251.	June 22, 1953	F-86F-10	USAF	Non-Fatal	Unknown (Take-off Accident)
252.	June 22, 1953	F-86F-5	USAF	Non-Fatal	Engine Failure
253.	June 18, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Take-off Accident)
254.	June 18, 1953	F-86F-10	USAF	Non-Fatal	Unknown (Landing Accident)

255.	June 17, 1953	Sabre F4	RAF	Non-Fatal	Oxygen Cylinder Exploded During Servicing
256.	June 15, 1953	Sabre F4	RAF	Non-Fatal	Pilot Error
257.	June 15, 1953	Sabre F4	RAF	Non-Fatal	Engine Failure
258.	June 12, 1953	Sabre F4	RCAF	Non-Fatal	Engine Failure
259.	June 9, 1953	Sabre F4	RCAF	Fatal	Unknown
260.	June 8, 1953	F-86E-10	USAF	Non-Fatal	Taxi Accident
261.	June 8, 1953	F-86F-30	USAF	Non-Fatal	Taxi Accident – Aircraft Parked
262.	June 8, 1953	F-86F-30	USAF	Non-Fatal	Taxi Accident – Aircraft Parked
263.	June 5, 1953	F-86E-1	USAF	Non-Fatal	Unknown
264.	June 5, 1953	Sabre F4	RAF	Fatal	Unknown
265.	June 3, 1953	RF-86F-30	USAF	Fatal	Unknown (Take-off Accident)
266.	June 2, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
267.	June 1, 1953	F-86E-6	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
268.	May 31, 1953	F-86F-30	USAF	Fatal	LOC (Pilot Disorientation – Bad Weather)
269.	May 31, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
270.	May 27, 1953	Sabre F4	RCAF	Non-Fatal	Asymmetric Slats Deployment
271.	May 23, 1953	F-86E-6	USAF	Non-Fatal	Taxiing Collision (Ground Accident)
272.	May 23, 1953	F-86E-5	USAF	Non-Fatal	Taxiing Collision (Ground Accident)
273.	May 23, 1953	F-86F-10	USAF	Non-Fatal	Unknown (Landing Accident)
274.	May 19, 1953	F-86F-30	South African AF	Non-Fatal	Landing Gear Failure (Landing Accident)
275.	May 4, 1953	F-86E-6	USAF	Fatal	Unknown (Crashed on Take-off)
276.	May 3, 1953	F-86E-10	USAF	Non-Fatal	Unknown (Landing Accident)
277.	May 2, 1953	F-86E-6	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
278.	April 30, 1953	F-86E-10	USAF	Non-Fatal	Unknown (Damaged by Explosion)
279.	April 26, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
280.	April 26, 1953	F-86E-6	USAF	Non-Fatal	Unknown (Landing Accident)
281.	April 22, 1953	F-86F-30	USAF	Non-Fatal	Mechanical Failure
282.	April 22, 1953	F-86E-5	USAF	Non-Fatal	Structural Failure
283.	April 19, 1953	F-86F-30	USAF	Non-Fatal	Landing Gear Failure (Landing Accident)
284.	April 18, 1953	F-86E-1	USAF	Non-Fatal	Mid-Air Collision
285.	April 16, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Ground Accident)
286.	April 5, 1953	Sabre F4	RCAF	Fatal	Engine Failure
287.	April 4, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Landing Accident)
288.	April 2, 1953	F-86E-6	USAF	Non-Fatal	Bird Strike
289.	March 26, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Ground Accident)
290.	March 22, 1953	F-86F-5	USAF	Non-Fatal	Unknown (Landing Accident)
291.	March 21, 1953	F-86F-30	USAF	Non-Fatal	Mechanical Failure
292.	March 19, 1953	F-86F-30	USAF	Non-Fatal	Unknown (Belly Landing)
293.	March 10, 1953	F-86A-5	USAF	Fatal	Unknown
294.	March 10, 1953	Sabre F4	RAF	Non-Fatal	Hard Landing
295.	March 6, 1953	F-86F-1	USAF	Non-Fatal	Unknown (Landing Accident)
296.	March 1, 1953	F-86F-5	USAF	Non-Fatal	Unknown (Take-off Accident)
297.	February 28, 1953	F-86F-30	South African AF	Non-Fatal	Fuel Exhaustion (Escort Lost Aircraft – Weather)

298.	February 20, 1953	F-86F-10	USAF	Non-Fatal	Unknown (Landing Accident)
299.	February 11, 1953	F-86F-15	USAF	Fatal	Unknown (Landing Accident)
300.	February 10, 1953	F-86E-6	USAF	Non-Fatal	Unknown (Landing Accident)
301.	February 7, 1953	F-86F-10	USAF	Non-Fatal	Unknown
302.	January 31, 1953	F-86F	USAF	Non-Fatal	Unknown
303.	January 31, 1953	F-86F	USAF	Unknown	Unknown
304.	January 31, 1953	F-86F	USAF	Unknown	Unknown
305.	January 31, 1953	F-86F	USAF	Unknown	Unknown
306.	January 31, 1953	F-86E-10	USAF	Non-Fatal	Mid-Air Collision
307.	January 30, 1953	F-86F-10	USAF	Non-Fatal	Unknown (Take-off Accident)
308.	January 28, 1953	F-86E-5	USAF	Non-Fatal	Unknown (Take-off Accident)
309.	January 26, 1953	F-86A	USAF	Unknown	Unknown
310.	January 20, 1953	F-86A	USAF	Unknown	Unknown
311.	January 14, 1953	F-86A	USAF	Unknown	Unknown
312.	January 12, 1953	F-86F	USAF	Unknown	Unknown
313.	January 11, 1953	F-86A	USAF	Unknown	Unknown
314.	January 8, 1953	F-86E	USAF	Non-Fatal	Unknown
315.	January 8, 1953	F-86E	USAF	Non-Fatal	Unknown
316.	January 4, 1953	F-86F-10	USAF	Non-Fatal	Unknown
317.	January 3, 1953	F-86E	USAF	Unknown	Unknown
318.	January 1, 1953	F-86	USAF	Fatal	Fuel Exhaustion (On Approach – Thunderbirds)
319.	December 25, 1952	F-86F-1	USAF	Non-Fatal	Aircraft Fire (Landing Accident)
320.	December 19, 1952	Sabre F4	RAF	Fatal	Crashed into Ground (Weather)
321.	December 13, 1952	F-86E-10	USAF	Non-Fatal	Engine Failure
322.	December 11, 1952	F-86A-5	USAF	Non-Fatal	Mid-Air Collision
323.	December 9, 1952	F-86F-1	USAF	Non-Fatal	Unknown (Ground Accident)
324.	December 5, 1952	F-86F-1	USAF	Non-Fatal	Aircraft Caught Fire after Take-off
325.	December 4, 1952	F-86A-5	USAF	Non-Fatal	Fuel Exhaustion (Forced Landing)
326.	December 3, 1952	F-86F-1	USAF	Non-Fatal	Unknown (Landing Accident)
327.	December 1, 1952	F-86A-5	USAF	Fatal	LOC (Stall/Spin)
328.	November 28, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Landing Accident)
329.	November 21, 1952	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
330.	November 20, 1952	F-86A-5	USAF	Fatal	Unknown (Ground Collision)
331.	November 19, 1952	F-86E-10	USAF	Non-Fatal	Engine Failure
332.	November 18, 1952	F-86E-10	USAF	Fatal	Pilot Reported Problem with Oxygen (Crashed into Ground)
333.	November 7, 1952	F-86E-10	USAF	Fatal	Unknown (Crashed into Ground)
334.	November 6, 1952	F-86E-10	USAF	Fatal	Crashed into Mountain – Bad Weather
335.	November 6, 1952	F-86E-6	USAF	Fatal	Crashed into Mountain – Bad Weather
336.	November 1, 1952	F-86F-1	USAF	Non-Fatal	Unknown (Landing Accident)
337.	October 24, 1952	F-86F-1	USAF	Non-Fatal	Unknown (Possible Compressor Stall)
338.	October 14, 1952	F-86F-10	USAF	Non-Fatal	Unknown (Landing Accident)
339.	October 12, 1952	F-86E-1	USAF	Non-Fatal	Unknown (Structural Failure)
340.	October 11, 1952	F-86F-1	USAF	Non-Fatal	Mechanical Failure (Landing Accident)

341.	September 28, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Landing Accident)
342.	September 21, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Take-off Accident)
343.	September 20, 1952	F-86E-10	USAF	Non-Fatal	Unknown
344.	September 18, 1952	F-86E-6	USAF	Non-Fatal	Unknown (Take-off Accident)
345.	September 10, 1952	F-86E-5	USAF	Non-Fatal	Engine Failure
346.	September 6, 1952	F-86F-1	USAF	Non-Fatal	Unknown (Landing Accident)
347.	September 5, 1952	F-86A-5	USAF	Non-Fatal	Compressor Failure
348.	September 4, 1952	F-86E-10	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
349.	August 21, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Landing Accident)
350.	August 14, 1952	Sabre F4	RAF	Non-Fatal	Elevator Runaway
351.	August 7, 1952	F-86E-5	USAF	Non-Fatal	Low on Approach – Hit Ground (Night)
352.	July 22, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Ground Taxi Accident)
353.	July 20, 1952	F-86E-5	USAF	Non-Fatal	Mechanical Failure (Take-off Accident)
354.	July 10, 1952	F-86A-5	USAF	Non-Fatal	Fuel System Failure – Engine Exploded/Take-off
355.	July 2, 1952	F-86E-5	USAF	Non-Fatal	LOC During Landing – High Cross-Winds
356.	June 5, 1952	F-86E-10	USAF	Non-Fatal	Explosion followed by Engine Flame-out (Take-off)
357.	June 1, 1952	F-86E-10	USAF	Non-Fatal	Unknown (Landing Accident)
358.	May 29, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Take-off Accident)
359.	May 28, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Ground Taxi Accident)
360.	May 23, 1952	F-86E-10	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
361.	May 23, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Landing Accident)
362.	May 21, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Ground Taxi Accident)
363.	May 6, 1952	F-86E-5	USAF	Non-Fatal	Unknown (Landing Accident)
364.	May 5, 1952	F-86A-5	USAF	Non-Fatal	Engine Failure (Landing Accident)
365.	April 30, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
366.	March 31, 1952	F-86A-5	USAF	Non-Fatal	Undershot Runway on Landing
367.	March 30, 1952	F-86E-1	USAF	Non-Fatal	Engine Failure (Take-off Accident)
368.	March 25, 1952	F-86E-5	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
369.	March 19, 1952	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Taxi Accident)
370.	March 14, 1952	F-86E-5	USAF	Fatal	Unknown (Test Flight - Engine)
371.	March 14, 1952	RF-86A-5	USAF	Non-Fatal	Fuel Starvation (Belly Landing)
372.	March 10, 1952	F-86A-5	USAF	Fatal	Pilot Hypoxia
373.	March 5, 1952	F-86E-10	USAF	Non-Fatal	Unknown (Ground Accident)
374.	February 26, 1952	F-86A-5	USAF	Unknown	Unknown
375.	February 23, 1952	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Take-off)
376.	February 13, 1952	F-86E-1	USAF	Non-Fatal	Engine Exploded
377.	February 7, 1952	F-86E	USAF	Non-Fatal	Engine Fire
378.	January 25, 1952	F-86A-5	USAF	Non-Fatal	Fuel Exhaustion (Forced Landing)
379.	January 25, 1952	F-86A-5	USAF	Non-Fatal	Unknown (Engine Failure)
380.	January 19, 1952	F-86E-5	USAF	Non-Fatal	Mechanical Failure (Take-off)
381.	January 18, 1952	F-86E-1	USAF	Non-Fatal	Unknown (Landing Accident)
382.	January 9, 1952	F-86E-10	USAF	Non-Fatal	Mechanical Failure (Take-off)
383.	January 2, 1952	F-86A-5	USAF	Unknown	Unknown

384.	December 19, 1951	F-86A	USAF	Non-Fatal	Unknown (Aircraft Crashed)
385.	December 16, 1951	F-86A-5	USAF	Non-Fatal	Unknown
386.	November 30, 1951	F-86A	USAF	Unknown	Unknown (Ground Accident)
387.	November 14, 1951	F-86A	USAF	Unknown	Unknown
388.	November 13, 1951	F-86A-5	USAF	Non-Fatal	Structural Failure
389.	November 9, 1951	F-86A	USAF	Unknown	Unknown
390.	November 9, 1951	F-86A	USAF	Unknown	Unknown
391.	October 16, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
392.	October 7, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Crashed Landed)
393.	September 29, 1951	F-86A	USAF	Unknown	Unknown
394.	September 25, 1951	F-86A-5	USAF	Unknown	Mid-Air Collision
395.	September 25, 1951	F-86A-5	USAF	Unknown	Mid-Air Collision
396.	September 21, 1951	F-86E	USAF	Unknown	Unknown (Landing Accident)
397.	September 21, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
398.	September 20, 1951	F-86A	USAF	Unknown	Unknown
399.	September 12, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Landing Accident)
400.	September 7, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Forced Landing)
401.	September 4, 1951	F-86A-5	USAF	Non-Fatal	Engine Failure (Landing Accident)
402.	August 26, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Landing)
403.	August 22, 1951	F-86A	USAF	Unknown	Unknown (Ground Accident)
404.	August 21, 1951	F-86E	USAF	Unknown	Unknown (Landing)
405.	August 14, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Take-off)
406.	August 11, 1951	F-86A	USAF	Unknown	Unknown
407.	August 8, 1951	F-86A	USAF	Unknown	Fuel Exhaustion (Forced Landing)
408.	August 8, 1951	F-86E	USAF	Unknown	Mid-Air Collision
409.	July 29, 1951	F-86A	USAF	Unknown	Unknown
410.	July 26, 1951	F-86A	USAF	Unknown	Unknown (Landing Accident)
411.	July 13, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Belly Landing)
412.	July 10, 1951	F-86A	USAF	Unknown	Unknown (Crashed Take-off)
413.	June 25, 1951	F-86A	USAF	Non-Fatal	Unknown
414.	June 22, 1951	F-86E	USAF	Unknown	Unknown (Crashed)
415.	June 16, 1951	F-86E	USAF	Unknown	Unknown (Landing)
416.	June 14, 1951	F-86A-5	USAF	Non-Fatal	Structural Failure
417.	June 13, 1951	F-86A	USAF	Unknown	Unknown (Crashed)
418.	June 13, 1951	F-86A	USAF	Non-Fatal	Unknown (Crashed)
419.	June 9, 1951	F-86A	USAF	Unknown	Unknown (Crashed)
420.	June 5, 1951	F-86A-5	USAF	Fatal	Unknown (Crashed Take-off)
421.	June 5, 1951	F-86E	USAF	Unknown	Unknown
422.	May 25, 1951	F-86A-5	USAF	Non-Fatal	Engine Failure
423.	May 23, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure (Belly Landing)
424.	May 20, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
425.	May 20, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure
426.	May 19, 1951	F-86A	USAF	Non-Fatal	Unknown (Crashed)

427.	May 10, 1951	F-86A	USAF	Non-Fatal	Ammo Explosion (Landing Phase)
428.	May 3, 1951	F-86A	USAF	Non-Fatal	Unknown (Landing Accident)
429.	May 2, 1951	F-86A	USAF	Non-Fatal	Unknown (Crashed)
430.	April 16, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
431.	April 14, 1951	F-86E	USAF	Unknown	Unknown
432.	April 10, 1951	F-86A	USAF	Non-Fatal	Unknown (Crashed)
433.	April 3, 1951	F-86A	USAF	Unknown	Unknown (Crashed)
434.	April 3, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Taxi Accident)
435.	April 1, 1951	F-86A	USAF	Unknown	Unknown (Forced Landing)
436.	March 30, 1951	F-86A-5	USAF	Unknown	Unknown (Landing Accident)
437.	March 25, 1951	F-86A-5	USAF	Non-Fatal	Nose Gear Collapsed (Standing Aircraft)
438.	March 21, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Taxi Accident)
439.	March 16, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
440.	February 24, 1951	F-86A	USAF	Unknown	Unknown (Crashed on Take-off)
441.	February 23, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
442.	February 22, 1951	F-86A-5	USAF	Non-Fatal	Unknown (Landing Accident)
443.	February 14, 1951	F-86A	USAF	Unknown	Unknown (Crashed)
444.	January 31, 1951	F-86A	USAF	Fatal	Unknown (Rocket Test-Firing)
445.	January 31, 1951	F-86A	USAF	Unknown	Unknown
446.	January 26, 1951	F-86A	USAF	Unknown	Unknown (Belly Landing)
447.	January 24, 1951	F-86A-5	USAF	Non-Fatal	Mechanical Failure
448.	January 23, 1951	F-86A	USAF	Unknown	Unknown
449.	January 22, 1951	F-86A	USAF	Non-Fatal	Unknown (Crashed)
450.	January 11, 1951	F-86A	USAF	Unknown	Unknown (Take-off)
451.	December 29, 1950	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
452.	December 27, 1950	F-86A	USAF	Unknown	Unknown (Crashed)
453.	December 27, 1950	F-86A	USAF	Unknown	Unknown (Take-off)
454.	December 21, 1950	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
455.	December 18, 1950	F-86A-5	USAF	Unknown	Unknown
456.	December 17, 1950	F-86A-5	USAF	Non-Fatal	Unknown (Belly Landing)
457.	December 2, 1950	F-86A-1	USAF	Non-Fatal	Mechanical Failure
458.	December 1, 1950	F-86A	USAF	Unknown	Unknown
459.	November 17, 1950	F-86A	USAF	Unknown	Unknown (Landing Accident)
460.	November 10, 1950	F-86A	USAF	Non-Fatal	Unknown (Crashed)
461.	November 8, 1950	F-86A	USAF	Unknown	Unknown (Landing Accident)
462.	November 7, 1950	F-86A	USAF	Unknown	Unknown (Landing Accident)
463.	October 18, 1950	F-86A	USAF	Unknown	Unknown (Weather)
464.	October 18, 1950	F-86A	USAF	Unknown	Unknown (Weather)
465.	October 18, 1950	F-86A	USAF	Unknown	Unknown (Weather)
466.	October 10, 1950	F-86A	USAF	Unknown	Unknown
467.	October 4, 1950	F-86A	USAF	Unknown	Unknown (Landing Accident)
468.	October 3, 1950	F-86A	USAF	Unknown	Unknown
469.	September 29, 1950	F-86A	USAF	Unknown	Unknown

470.	September 17, 1950	F-86A	USAF	Unknown	Unknown
471.	September 15, 1950	F-86A	USAF	Unknown	Unknown
472.	September 13, 1950	F-86A	USAF	Unknown	Unknown
473.	September 7, 1950	F-86A	USAF	Unknown	Unknown
474.	August 29, 1950	F-86A	USAF	Unknown	Unknown (Landing Accident)
475.	August 18, 1950	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
476.	August 12, 1950	F-86A-5	USAF	Non-Fatal	LOC (Pilot Bailed-out)
477.	August 1, 1950	F-86A-5	USAF	Non-Fatal	Bird Strike
478.	June 21, 1950	F-86A-5	USAF	Fatal	Unknown (Crashed)
479.	June 20, 1950	F-86A	USAF	Non-Fatal	Ground Collision
480.	June 20, 1950	F-86A	USAF	Non-Fatal	Ground Collision
481.	May 19, 1950	F-86A	USAF	Unknown	Unknown
482.	May 19, 1950	F-86A	USAF	Non-Fatal	Unknown (Crashed)
483.	May 14, 1950	F-86A	USAF	Unknown	Unknown
484.	May 6, 1950	F-86A	USAF	Unknown	Unknown
485.	April 23, 1950	F-86A	USAF	Unknown	Unknown (Take-off)
486.	March 22, 1950	F-86A	USAF	Unknown	Unknown
487.	March 22, 1950	F-86A	USAF	Unknown	Unknown
488.	February 8, 1950	F-86A-5	USAF	Non-Fatal	Engine Failure
489.	February 8, 1950	F-86A	USAF	Non-Fatal	Unknown (Forced Landing)
490.	February 3, 1950	F-86A-5	USAF	Non-Fatal	Mid-Air Collision
491.	January 4, 1950	F-86A-5	USAF	Non-Fatal	Engine Failure (Ditched)
492.	October 20, 1949	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
493.	September 15, 1949	F-86A-5	USAF	Non-Fatal	Mechanical Failure
494.	August 31, 1949	F-86A-5	USAF	Non-Fatal	Landing Accident
495.	August 18, 1949	F-86A-5	USAF	Non-Fatal	Landing Accident
496.	June 26, 1949	F-86A-5	USAF	Non-Fatal	Mechanical Failure on Landing
497.	February 3, 1949	F-86A-1	USAF	Non-Fatal	Mechanical Failure on Landing

Sample RAF Sabre Accidents (1952-1956)

1.	19/12/1952	XB534	Sabre F4	1 Long Range Ferry Unit	CFIT	The aircraft was letting down to Prestwick, Ayrshire after a flight from Keflavik while on delivery with two other Sabres. It became separated from the others in cloud and dived into the ground at high speed, killing the pilot.
2.	10/03/1953	<u>XB549</u>	Sabre F4	147 Sqn	Flight Controls Failure	During its delivery flight to Abingdon from Canada the controls stiffened. The pilot diverted to Stornoway, Outer Hebrides but the aircraft was caught by a gust of wind during a flapless landing. It struck the ground hard and went off the side of the runway causing the nose wheel to collapse and shedding the wing tanks.
3.	05/04/1953	XB610	Sabre F4	147 Sqn	Instrument Failure	Dived into the ground at high speed seven miles NE of Grantown-On-Spey, Morayshire after suffering instrument failure shortly after take off from Kinloss. The pilot was killed. The aircraft had been on delivery from Canada to the RAF.
4.	27/05/1953	XB835	Sabre F4	RCAF loan	Asymmetric Slats Deployment	While operating with 422 Sqn RCAF, control was lost due to suspected asymmetric slats problem. The pilot ejected and the aircraft crashed near Aylmer, Quebec, Canada.
5.	05/06/1953	XB863	Sabre F4	147 Sqn	Unknown	All radio aids were lost while in cloud while on delivery from Canadair at Caterville to the RAF. It crashed six miles NE of St. Felix-De-Valois, Canada.
6.	09/06/1953	XB806	Sabre F4	RCAF loan	Unknown	Prior to delivery to the RAF it was operating with 414 Sqn RCAF. On this day it dived straight into the ground at Bagotville, Canada, killing the pilot.
7.	12/06/1953	XB816	Sabre F4	RCAF loan	Engine Failure	Prior to delivery to the RAF it was operating with 414 Sqn RCAF. Written off when it landed short of the runway at Bagotville, Canada after suffering engine failure, the pilot survived. Another Sabre was allocated the serial XB816 and was delivered to the RAF.
8.	15/06/1953	XB603	Sabre F4	Sabre Conversion Flight	Pilot Error	The pilot approached Wildenrath, West Germany too fast and too steep. He raised the flaps too soon causing the aircraft to sink, then a too rapid movement of the throttle caused compressor failure. The aircraft struck the ground tail first and broke its back. The pilot survived.
9.	15/06/1953	XB769	Sabre F4	RCAF loan	Engine Failure	While operating with 414 Sqn RCAF the engine flamed out when on approach to Bagotville, Canada. Control was lost and it struck the ground and ran into a tree. The pilot escaped without serious injury.
10.	17/06/1953	XB676	Sabre F4	Sabre Conversion Flight	Oxygen Cylinder Exploded During Servicing	Damaged beyond repair when an oxygen cylinder exploded during servicing at Wildenrath, West Germany, which started a fire.
11.	18/07/1953	XB882	Sabre F4	147 Sqn	Landing Gear Door Failure	While on delivery from Canada to 147 Sqn the undercarriage doors began to open and close by themselves, the generator light came on and the cockpit filled with fumes. The pilot intended to jettison the canopy to clear the smoke but pulled the ejection handle as well. The aircraft crashed four miles north of Broughty Ferry, Angus.
12.	18/08/1953	XD775	Sabre F4	147 Sqn	Stabilizer Malfunction	Pilot ejected after the stabilizer malfunctioned while on its delivery flight. It crashed at St. Hubert, Canada.
13.	17/09/1953	XB683	Sabre F4	67 Sqn	Pilot Error	During a steep climb the pilot removed his helmet to put on his sun glasses. The nose pitched up and his helmet fell between the stick and the console. He was unable to control the aircraft properly and ejected. It crashed six miles from Liege, Belgium.
14.	06/11/1953	XB690	Sabre F4	67 Sqn	Mid-Air	The aircraft were part of a four ship formation acting as intercept targets for Belgian F-84s over West Germany. During a formation change the pair collided. The pilot of XB690 ejected but XB730 exploded, this ejected the pilot but he was killed. The aircraft crashed near Mochengladbach.
15.	06/11/1953	XB730	Sabre F4	67 Sqn	Mid-Air	
16.	28/12/1953	XB745	Sabre F4	RCAF	Engine Failure	Although operating with the Royal Canadian Air Force it carried its RAF serial as it was to be delivered shortly. It crashed near Beauvechain, Belgium after the pilot had ejected following engine failure. Another Sabre, 19635, was allocated to XB745.
17.	10/02/1954	XB681	Sabre F4	3 Sqn	Overrun	Landed halfway down the runway at Geilenkirchen, West Germany. The pilot realized that he could not stop and raised the undercarriage to reduce damage. It ran off the runway into the undershoot area.
18.	24/02/1954	XB866	Sabre F4	26 Sqn	Anoxia	Radio contact was lost after take off from Oldenberg, West Germany. No wreckage or body were found and it is thought that the pilot was suffering from anoxia and flew into the sea.
19.	24/02/1954	XB667	Sabre F4	3 Sqn	CFIT	Both aircraft dived into high ground at Henri-Chapelle, Belgium during a formation flight. Possibly due to the leader not allowing sufficient height to recover from a dive.
20.	24/02/1954	XB643	Sabre F4	3 Sqn	CFIT	
21.	02/03/1954	XB763	Sabre F4	RCAF loan	Fuel Starvation	Ran out of fuel during a sortie from Baden-Sollingen, West Germany while operating with 422 Sqn RCAF. The pilot ejected and it crashed somewhere in Belgium. See XB825 below.
22.	02/03/1954	XB825	Sabre F4	RCAF loan	Fuel Starvation	Ran out of fuel and crashed in Belgium after the pilot ejected. Possibly flying with XB763 above. The serial XB825 was allocated to another Sabre.
23.	03/03/1954	XB912	Sabre F4	112 Sqn	Engine Failure	The pilot attempted to overshoot from an abortive approach at Bruggen, West Germany. The engine failed to give full power and it crashed into the undershoot area and caught fire.
24.	04/03/1954	XB936	Sabre F4	67 Sqn	Over Rotation	During take off from Wildenrath, West Germany the pilot raised the nose too high so that the wings acted as air brakes. The aircraft lifted only 4 ft off the ground at the end of the runway. The starboard drop tank hit an obstruction causing the aircraft to stall and crash.
25.	22/03/1954	XB600	Sabre F4	67 Sqn	Electrical Failure	Suffered an electrical failure ten minutes after take off from Wildenrath, West Germany. The pilot was unaware of the emergency procedure to lower the undercarriage or how to operate the generator reset switch. He jettisoned the drop tanks and made a wheels up landing back at base.

26.	13/05/1954	XD773	Sabre F4	66 Sqn	Engine Failure	Engine failed while on approach to Linton-on-Ouse, Yorkshire due to main fuel regulator failure. The pilot made a forced landing in the undershoot area..
27.	03/06/1954	XB648	Sabre F4	130 Sqn	Tire Burst	The port tyre burst on take off from Bruggen, West Germany causing the aircraft to veer onto the grass. The pilot tried to raise the undercarriage but only the nose wheel retracted causing extensive damage to the nose.
28.	16/06/1954	XB884	Sabre F4	112 Sqn	Electrical Failure	Suffered an electrical failure shortly after take off from Bruggen, West Germany. While making an emergency landing back at base the flight control system went u/s and put the aircraft into a steep climb. The pilot ejected safely.
29.	16/06/1954	XD711	Sabre F4	66 Sqn	Mid-Air	During a four ship formation break to port the pilot of XD711 (the section leader) broke sharply, while XD716 broke slowly. They collided and crashed near Hornsea, Yorkshire. Both pilots ejected.
30.	16/06/1954	XD716	Sabre F4	66 Sqn	Mid-Air	
31.	22/06/1954	XB940	Sabre F4	4 Sqn	Fuel Starvation	The pilot lost contact with his formation in haze. He became lost and attempted to return to Jever, West Germany. Due to low fuel he diverted to Hamburg. He considered that he had insufficient fuel to make the runway and landed on an autobahn short of the airfield
32.	29/06/1954	XB819	Sabre F4	234 Sqn	Engine Failure (Fuel Leak)	Written off in a forced landing four miles ENE of Julich, West Germany after the engine failed due to a fuel leak. The pilot survived.
33.	08/07/1954	XB647	Sabre F4	4 Sqn	LOC	Flicked over and rolled into the ground after a low speed climb out from an overshoot at Jever, West Germany with dive brakes extended.
34.	22/07/1954	XD730	Sabre F4	66 Sqn	CFIT	The pair were part of a four ship formation and were letting down through cloud. The leader ordered not below 3,000 ft but the two pilots did not acknowledge. They flew into Kinder Scout Ridge on Ashop Moor near Glossop, Derbyshire. Neither pilots ejected and were killed.
35.	22/07/1954	XD707	Sabre F4	66 Sqn	CFIT	
36.	22/07/1954	XD758	Sabre F4	66 Sqn	Anoxia	The pilot suffered lack of oxygen at 40,000 ft. When reducing height both fire warning lights came on. They remained on even though the pilot throttled back so he ejected. The aircraft crashed two miles NE of Helmsley, Yorkshire. He may have suffered anoxia due to his mask slipping.
37.	23/07/1954	XB865	Sabre F4	26 Sqn	LOC/Engine Failure	During a tail chase the pilot overstressed the airframe when recovering from a dive. The engine flamed out then caught fire. As he ejected the aircraft exploded and crashed four miles from Hede, West Germany. He did not undo the seat straps before pulling the rip cord for the chute and was killed.
38.	05/08/1954	XB638	Sabre F4	20 Sqn	Overrun	When carrying out a roller landing in the dark at Oldenberg, West Germany the aircraft struck a tree, damaging a wing. It struck the ground and burnt out throwing the pilot clear still strapped in his seat.
39.	10/08/1954	XD768	Sabre F4	66 Sqn	Fuel Starvation	The pilot made an emergency landing at Full Sutton, Yorks after suffering partial engine failure at 15,000 ft due to fuel starvation caused by a faulty oil filter. It landed half way up the runway and during braking the port tyre burst causing it to swing off the runway. The undercarriage was raised to stop.
40.	27/08/1954	XD776	Sabre F4	66 Sqn	Fuselage Fire Heat Control Failure	During a display rehearsal the cockpit filled with smoke and flames caused by a fire in the port ammunition bay due to heat control failure. The pilot ejected and the aircraft crashed twelve miles SW of North Luffenham, Rutland.
41.	02/09/1954	XB734	Sabre F4	26 Sqn	Landing Gear Failure	Following undercarriage failure the pilot was unable to lower the manual lever due to a loose bolt in the mechanism. He landed the aircraft on the grass at Oldenburg, West Germany beside the runway.
42.	07/09/1954	XB627	Sabre F4	67 Sqn	Fuel Starvation	The pilot noticed a condensation trail above him and decided to investigate it. He then descended from 35,000 ft to 500 ft and discovered that he was lost. The aircraft ran out of fuel and he made an emergency landing in a field three miles south of Peer, Belgium.
43.	21/09/1954	XD733	Sabre F4	92 Sqn	LOC	On completion of a night sortie the pilot stated that he was above the airfield at Linton-on-Ouse. Two minutes later the aircraft crashed into a local landmark on Georef Hood Hill in the Hambleton Hills, Yorkshire. The pilot did not eject and was killed.
44.	22/09/1954	XB899	Sabre F4	20 Sqn	Pilot Error	During transfer of the squadron from Oldenburg the pilot forgot to lower the undercarriage and made a wheels up landing at Schleswigland, West Germany.
45.	29/09/1954	XD771	Sabre F4	92 Sqn	Engine Failure	Suffered engine failure while on approach to Linton-on-Ouse, Yorkshire and crashed into a field.
46.	08/10/1954	XB937	Sabre F4	4 Sqn	LOC/High G Black Out	Dived into the North Sea nine miles off Sylt, West Germany during a tail chase. The pilot had possibly blacked out during a high G turn.
47.	19/10/1954	XB988	Sabre F4	130 Sqn	In-Flight Fire	Caught fire at night and crashed out of control seven miles NE of Kassel, West Germany. The pilot did not eject and was killed.
48.	23/10/1954	XB711	Sabre F4	229 OCU	LOC	The aircraft was No. 4 in a four ship formation. Due to cloud the leader was unable to locate No. 3 and 4 and ordered them to return to Chivenor independently. XB711 entered more cloud and was not seen again. The pilot had probably lost control and crashed into the sea. The formation was in fact 150 miles from the intended position.
49.	26/10/1954	XB628	Sabre F4	71 Sqn	Mid-Air	The pilot of XB729 carried out an unannounced attack on XB628 but collided with it. Both aircraft crashed ten miles from Krefeld, West Germany. Both pilots were thrown from their aircraft and after releasing their seats, made a normal parachute descent.
50.	26/10/1954	XB729	Sabre F4	71 Sqn	Mid-Air	
51.	29/10/1954	XB927	Sabre F4	130 Sqn	Engine Failure	The engine failed while on approach to Bruggen, West Germany due to fuel regulator failure. A forced landing was made in the undershoot area.
52.	29/10/1954	XB860	Sabre F4	234 Sqn	In-Flight Break Up	Exploded and broke up over Wintraal, Netherlands after being overstressed during a test flight. The pilot ejected but his chute failed to open. He landed in an apple tree, still attached to the seat, suffering serious injuries. The aircraft crashed at Sittard.

53.	24/11/1954	XB612	Sabre F4	3 Sqn	LOC/Take-Off	Damaged during a formation take off from Geilenkirchen, West Germany when the port wheel left the runway. The aircraft swung round and the nose wheel struck a sodium flare and collapsed. Not repaired and declared a write off.
54.	29/11/1954	XD772	Sabre F4	66 Sqn	Engine Failure	The pilot abandoned the aircraft over the North Sea due to engine failure. It flew seventeen miles inland and crashed near Kelstern, Lincs. The pilot was rescued.
55.	29/01/1955	XD713	Sabre F4	92 Sqn	Pilot Error	Badly damaged when the pilot retracted the undercarriage on take off from Linton-on-Ouse, Yorkshire after the starboard tyre burst. Later declared a write off.
56.	04/02/1955	XB760	Sabre F4	71 Sqn	Flight Control Jamming	The pilot lost control while in cloud and crashed two miles from Julich, West Germany. A pair of damaged pliers were found near the wreckage and it is possible that these had jammed the flying controls.
57.	10/02/1955	XB839	Sabre F4	26 Sqn	LOC	Dived into the ground from low level eight miles from Oldenburg, West Germany after take off. The pilot ejected but was dragged back along the top of the aircraft, struck the tail and was killed.
58.	24/02/1955	XB623	Sabre F4	26 Sqn	LOC/Take-Off	Swung to starboard during a formation take off from Oldenburg, West Germany. The pilot did not correct it and the starboard wing struck a snow bank causing the nose wheel to collapse.
59.	16/03/1955	XD755	Sabre F4	66 Sqn	LOC/Landing	A low speed descending turn onto the approach at Driffield, Yorks resulted in the aircraft rolling out of control and crashing. The pilot was killed.
60.	05/04/1955	XB634	Sabre F4	67 Sqn	Mid-Air	Both aircraft were on approach to Wildenrath, West Germany. The Sabre pilot had been warned of the Anson ahead of him but continued his approach. He collided with the Anson and both aircraft crashed one mile east of the airfield killing all occupants.
61.	06/04/1955	XD710	Sabre F4	92 Sqn	Over Rotation	During take off from Acklington, Northumberland the pilot mistakenly thought that the aircraft was not becoming airborne. He abandoned take off and swung the aircraft onto the grass causing the nose wheel to collapse. Later declared a write off.
62.	03/05/1955	XB615	Sabre F4	234 Sqn	Fuel Starvation Fuel System Failure	Made a wheels up landing in a field one mile from Puffendorf, West Germany after the engine had flamed out while on approach to Geilenkirchen. The engine had suffered fuel starvation due to drop tank feed failure.
63.	14/05/1955	XD780	Sabre F4	92 Sqn	LOC/Landing	Stalled during a turn onto the approach to Linton-on-Ouse, Yorks in heavy rain. The port wing struck the ground and the aircraft slid along on the undercarriage until it collapsed. It came to rest by the side of the runway.
64.	16/05/1955	XB699	Sabre F4	3 Sqn	LOC	The aircraft was joining up after a tail chase over the Netherlands. The leader in XB699 rolled suddenly to starboard, pulled sharply across No.2 and continued rolling into cloud. It left the cloud in a steep dive, hit the ground at Vaals and exploded. The pilot did not eject.
65.	16/06/1955	XD712	Sabre F4	66 Sqn	In-Flight Break-Up	The pilot blacked out during a tail chase. Upon regaining consciousness he overstressed the airframe when trying to regain control to such an extent that it broke up and cartwheeled through the air. It crashed into the Humber Estuary nine miles off Scunthorpe. The pilot did not eject and was killed.
66.	24/06/1955	XB677	Sabre F4	92 Sqn	Over Rotation	During a scramble take off from Linton-on-Ouse, Yorkshire the pilot raised the nose too early. The wings acted as air brakes and the aircraft ran through the boundary fence and caught fire.
67.	26/06/1955	XB633	Sabre F4	3 Sqn	Pilot Error	During a formation take off from Eindhoven, Holland the pilot retracted the undercarriage too early causing the aircraft to sink back and scrape the runway. He lowered the undercarriage but could not stop. It ran into the bomb dump adjacent to the overshoot area and exploded. The pilot was thrown clear but was seriously injured. Jetwash from the leading aircraft may have been a factor..
68.	05/07/1955	XB950	Sabre F4	112 Sqn	Engine Failure/Fire	Shortly after an overshoot at Bruggen, West Germany the aircraft exploded and went into a dive. It cleared a row of houses and then crashed one mile from Heerlen, Holland killing the pilot. A severe fuel leak caused by a defective connection in the fuel pump had allowed fuel into the compressor area of the engine.
69.	12/07/1955	XB932	Sabre F4	130 Sqn	LOC/Landing	The pilot applied power too late after his approach speed to Bruggen, West Germany was too slow. The starboard wing struck the undershoot area as the engine revs picked up. This carried the aircraft along the runway until the pilot was able to shut off the fuel.
70.	15/07/1955	XB880	Sabre F4	71 Sqn	LOC/Landing	While in a slow speed high bank turn onto the approach to Bruggen, West Germany the aircraft lost height and the port wing struck the ground. The aircraft then exploded, killing the pilot.
71.	03/08/1955	XB548	Sabre F4	93 Sqn	LOC/High-Speed Stall	Suffered a high speed stall when pulling up steeply from an attack run on the Meppen Range, West Germany. It struck the ground and exploded killing the pilot.
72.	16/08/1955	XB808	Sabre F4	20 Sqn	LOC/High-Speed Stall	Suffered a high speed stall during a high G manoeuvre when pulling up from an attack run on the Meppen Range, West Germany. It hit the ground and exploded killing the pilot.
73.	17/08/1955	XB700	Sabre F4	26 Sqn	Mid-Air	The Sabre was orbiting Yeovilton, Somerset at 1,000 ft three miles east of the airfield when it was struck by the Sea Hawk which was carrying out a GCA approach. Both aircraft crashed killing the pilots.
74.	02/09/1955	XB735	Sabre F4	234 Sqn	Fuel Starvation	Hit a pylon and crashed after the engine had failed due to fuel starvation while on approach to Brindisi, Italy. The pilot was trapped in the cockpit and was killed by a fire in the cockpit area.
75.	25/01/1956	XD729	Sabre F4	66 Sqn	Engine Failure	Belly landed at Linton-on-Ouse, Yorks after the engine lost power during an overshoot.

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